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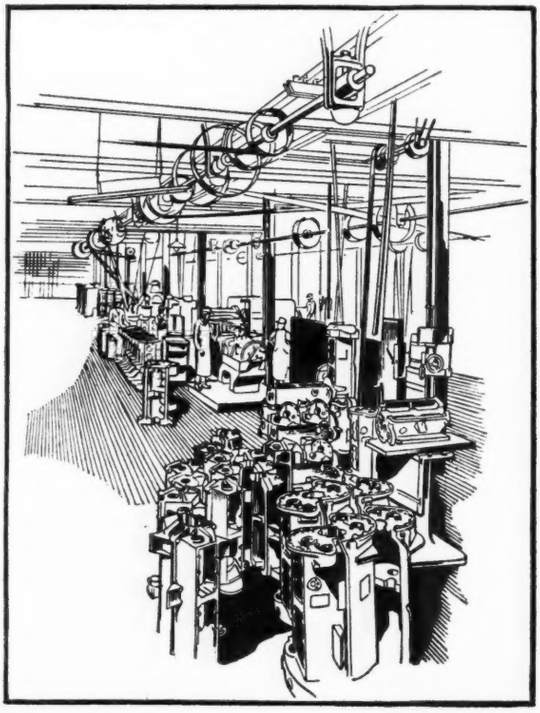

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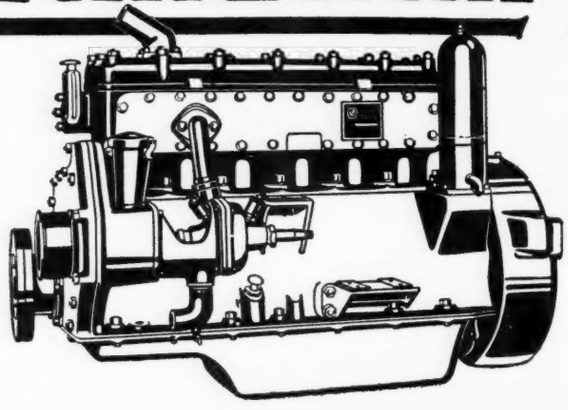


AUTOMOTIVE INDUSTRIES
VOLUME 57 *Philadelphia, Saturday, August 13, 1927* NUMBER 7

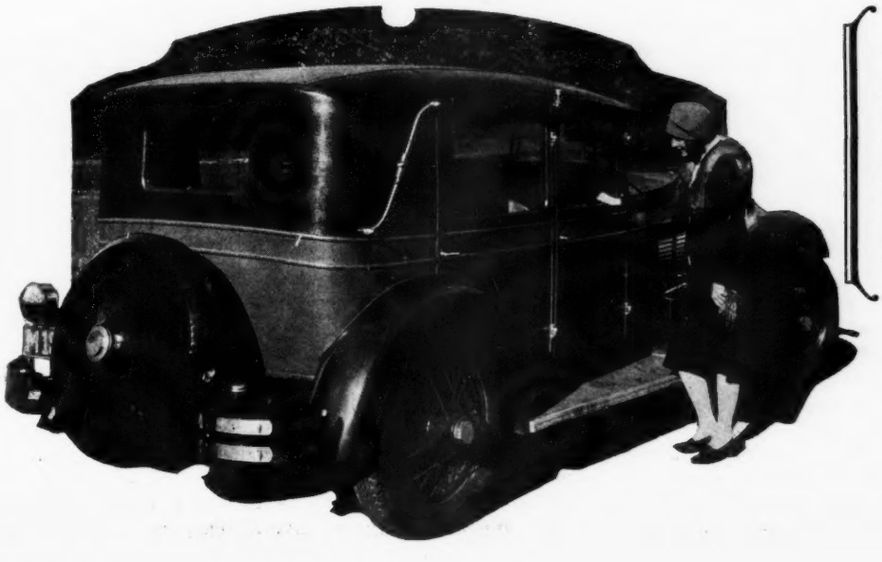
"Beauty Doctors" Take *a* Hand *in* Automotive Design

Aesthetic appeal has become almost as important as performance in eyes of buying public and manufacturers of cars and accessories are adding artists to their staffs.

By Norman G. Shidle

"An assemblage of graces or properties pleasing to the sight, or any of the senses of the mind." Certainly it would have been impossible so to describe the early products of the automobile industry, however marvelous they may have been from a mechanical or utilitarian standpoint. Today there are plenty of motor cars and parts which even the aesthetically-minded might select to qualify under the foregoing definition of beauty as given by Webster. Tomorrow, unless all signs, both economic and artistic, fail, there will be few automotive units capable of maintaining a high place in the competitive market unless they do meet the requirements of that definition.

This year as a matter of fact has many indications of being nearly at the turn of the wheel. About four or five years ago colors began to be used in some profusion on automobile bodies, replacing the standard black which had been common on most American-built cars for many years. Lower priced cars began to include as regular equipment bangles and baubles which previously had been confined to only the higher priced vehicles. Automobiles—the products which had come to be known primarily as individual transportation machines—suddenly began to shine and glow with all the iridescence of a Christmas tree or the spangles on a circus equestrienne's tights. The quest for beauty in



EVERY year recently there have been fewer and fewer car models on the market which made relatively little appeal to that sense of beauty which seems to be latent in everyone. By the end of 1927 the number of such models will have decreased to so small a percentage as to be negligible. The new Ford model will of course be eagerly scanned from this new viewpoint

automotive design had begun.

That search has been going on ever since, but only in quite recent months, comparatively speaking, has it been carried forward with the same employment of competent talent and reliance on expert craftsmanship that long have been a matter of course in the design of the mechanical elements of the automobile and its parts and accessories.

For a long while there was that confusion of thought which made executives confound ordinary good taste with artistic ability. Men in authority who would admit without hesitation that they couldn't design a rear axle have been known to appear almost insulted when their judgment about the beauty of a body design was disputed. Men possessing that wonderful executive quality of knowing when they don't know about mechanical construction on occasion have voiced strong and unequivocal opinions as regards matters of body design and appearance and have maintained those opinions in the face of rather strong opposition. That old, overworked phrase *de gustibus non disputandum* has often been the chief bulwark of defense for these opinions.

A Change in Ideas

But gradually a change has come about. It is being recognized that a man may be well endowed with good taste in selecting neckties and clothing for himself without having the artistic skill which will enable him to evolve body lines or color designs in harmony with the best aesthetic standards, or even to suggest specific, detailed changes in a design presented to him which will bring it in line with those standards. The existence of artists as skilled workers in a craft with a complex technique of its own is just now being fully recognized by automobile manufacturers as well as by manufacturers in many other industries. And as this recognition has grown, so has grown also the number of actual attempts to bring skilled artists into the work of automotive producing organizations and to correlate the results of their efforts with those of the mechanical engineers whose genius has built into automobile construction the efficiency and utility which it possesses today.

The results of this new attitude on the part of the industry have been showing up clearly in recent years and remarkable progress has been made as a result. Today a number of automotive manufacturing concerns are employing men whose sole task it is to produce motor cars the appearance of which will be not only striking but permanently pleasing. Parts manufacturers in several cases, looking far into the future, have engaged expert artists to work up parts or accessory designs which will harmonize in appearance and lines to the fullest extent with the vehicle for which they are intended. It is no longer considered sufficient that a bumper should protect the car and its owner from accident; it must also enhance the eye-appeal of the vehicle and help to lend an air of distinction and individuality. It is no longer sufficient that a window lift be capable of readily raising or lowering a car window; it must add something to the beauty of the interior and harmonize with the rest of the car fittings, upholstery and general design. Even some valve manufacturers have come to believe that an attractive appearance has some definite merit in making their product more salable, assuming that its performance is at least equal to that of other similarly priced products, and they are putting their theory to the test.

Progressive parts and accessory makers are more and more viewing their product as an integral unit of the car on which it is going to be used, rather than as something to serve a purely utilitarian purpose which, regardless of appearance, can be added to the already designed vehicle.

The current trend is well expressed in the advertising copy of one parts company which is doing considerable work along this line when it says: "The motor car of harmonized appearance definitely has arrived. In the production of this advanced type of automobile, appointments and fittings must be a carefully considered unit in the initial plan of the car's design."

To carry out its ideas this particular company has engaged a special staff of artists and engineers to work out just this phase of their design work. Another company, producing bumpers, has engaged three men specially to provide units of real artistic value, properly harmonized with the lines of individual car models. The General Electric Co., it is understood, maintains a committee on beauty, with a representative from each department. Important body builders long since have found it essential to include in their staff at least one man whose chief function it shall be to approach design and coloring primarily from the standpoint of artistic harmony and aesthetic correctness.

Thus, throughout the whole industry has grown a fuller conception of the commercial power of beauty; of the vast competitive value of a product which is "an assemblage of graces or properties pleasing to the sight, or any of the senses of the mind."

Every year recently there have been fewer and fewer car models on the market which made relatively little appeal to that sense of beauty which seems to be latent in every one. By the end of 1927 the number of such models will have decreased to so small a percentage as to be negligible. The few cars which thus far have made the least apparent effort to compete in the realm of beauty seem likely to fall in line with the general public demand on this score before 1928 begins. The new Ford model will of course be eagerly scanned from this new viewpoint. And there are those among careful students of present-day merchandising who will tell you that the ability of the new Ford to measure up as regards beauty of appearance will have at least as much part in determining Ford's ability to regain his former position in the field as will any of the more fundamental mechanical changes which may be made.

How Eye-Appeal Works

This statement comes from the somewhat closer examination which has been given recently to the practical commercial value of appearance in cars and car fittings. Just how the eye-appeal works in specific cases is instanced by a story we heard the other day. Two men went to have a demonstration of a new automobile. One of these prospects had already looked at the car rather carefully a number of times, had examined a good many photographs of it and went to the demonstration with the feeling that this was "one of the sweetest looking automobiles he had ever seen." Its beauty had made a distinct impression on him before he ever stepped into it. The other prospect had seen the car, but knew little about it personally and had not examined it nor been near it particularly.

The demonstration took place. Both prospects were pleased with the performance of the car. As they stepped out, the first man was just on the verge of saying, "And isn't it a nice, easy riding job, too." Before he got the words formulated, however, his companion exclaimed: "That's a fine performer, but it is certainly a hard riding baby for that price of car."

Both men had had the same ride. But each had approached that ride with a specific psychological background. One was ready to have an easy ride; the other

wasn't prejudiced. Undoubtedly, the looks of the car helped determine the effect of its riding qualities on one of the prospects. The example is cited not to urge beauty as a feature with which to cover up mechanical defects in design, but to illustrate its possibilities in having very practical effects.

The outstanding feature of automotive design today probably is this trend toward harmony between all parts of the vehicle, both mechanically and artistically, in place of a mere striving for something different, however discordant or abnormal, which characterized some of the earlier attempts at color combination. So marked has been the progress toward really charming designs and so strenous is the effort which is being made toward even finer conception for the future, that we are emboldened to repeat a bit of a pipe dream which we had just about one year ago—and which today seems to have greater rather than less chance of fulfillment than it did at that time.

"Before another decade is passed," ran the paragraphs in our issue of July 26, 1926, "it is perfectly possible that the automotive industry will have made a definite recognizable contribution to the advancement of American aesthetic taste. Body color combinations are being studied with the idea that they may be made artistically correct and emotionally satisfying and not merely bizarre and capable of attracting momentary attention by their vividness. Progress in this direction already can be noticed. Then there is the beauty of a perfectly functioning mechanism, not yet achieved by the automotive engineer but constantly before him as the goal of his efforts. Twenty-five years hence we may look down on a scene of traffic congestion which will reflect colorshadings and combinations of hues as aesthetically satisfying as the impression made by a beautiful painting, while the emotional pleasantness of the scene will be unmarred by gear noise, body squeaks or other raucous sounds.

"Who shall say that in the future the automobile may not contribute to the artistic life of the country in some measure at least, as it has contributed to the economic and sociel life in the past?"

It is interesting to note that the automotive industry has not been alone in its growing conception of the merchandising power of beauty. Many other industries, some of them making and selling quite prosaic products, have been at work along similar lines. This general tendency to capitalize the commercial power of beauty is outlined in a particularly interesting article, "Beauty the New Business Tool," written by Ernest Elmo Calkins and published in the August, 1927, issue of *The Atlantic Monthly*.

This article contains much that will be of interest to every automotive man whether he be general executive, sales manager, engineer or production man. Mr. Calkins lays an important part of Chevrolet's advance and Ford's decline to the beauty factor, voicing the opinion that "the Chevrolet company added design and color to mechanical efficiency and then for the first time in the history of the motor car the output of the Ford company was exceeded by a rival manufacturer. The Chevrolet company produces more cars than Mr. Ford and beauty has become a commercial talking point."

Speaking of the phonograph industry, Mr. Calkins makes a point that has a direct automotive application when he points out that "when mechanical improvements were exhausted they turned to aesthetic ones . . . . " It is important to remember, as the automotive industry is doing, that beautification cannot in any sense take the place of mechanical perfection and that the sequence indicated by Mr. Calkins as having taken place in the phonograph industry is the logical and sound one to be followed in any industry. From now on, however, the pulling power of beauty having been so firmly established, it is to be expected that beautification may follow on the heels of mechanical improvement more rapidly than in the past.

The entire trend is well summarized by Mr. Calkins when he concludes that: "If it is true that there is in all of us an inherent craving for beauty, we may rest confident in the assurance that each new ugly thing that is hurled at us by the machines will, under the softening influence of time, use, demand and competition, evolve into something better to look at."

French Warned of American Progress

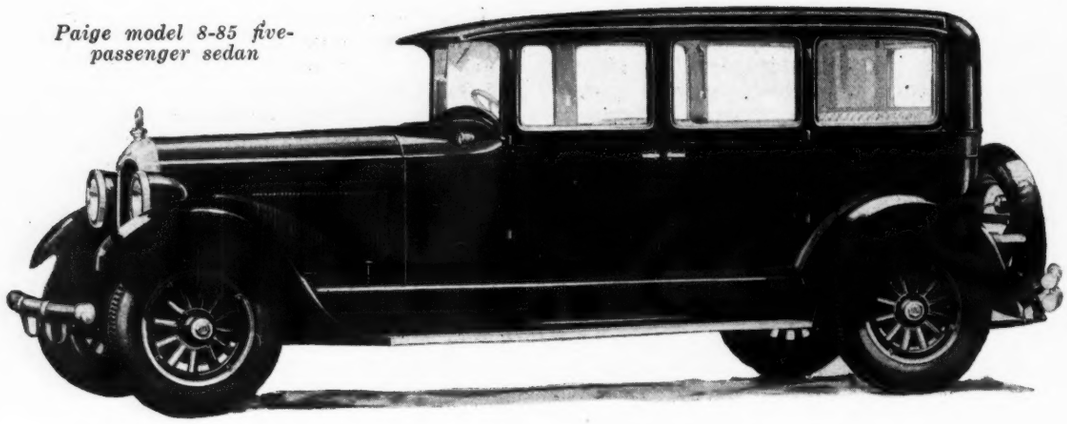
By W. F. Bradley

PARIS, July 28 (*by mail*)—"For France and similar countries the French car is better than the American automobile; in the United States the American machine is preferable," says Charles Faroux, editor of *La Vie Automobile*, in summing up impressions of his recent visit to America.

"Whether we admit it or not, conditions of use influence the manufacturerer. If our traffic conditions became similar to those of America we should adopt American types; in the same way if the United States had French conditions, her makers would adopt French lines of construction. Big piston displacement is agreeable; but we have our taxation law. Because of intense traffic conditions, the American automobile has to be flexible, silent, and provided with very easy steering. At high speeds American steering gears are less agreeable and less sure.

"There is nothing new in this and there would be no new conclusions to form if a new fact had not arisen. This is the improvement in American highways and changes in traffic laws. It is now possible in the United States, as in France, to drive at fairly high speeds to the indifference of traffic policemen. As a consequence the American automobile manufacturer is now giving much more attention to steering, braking, and general balance. Enormous progress has been made. In machining, balance, tool equipment, and perfect workmanship, marvels have been accomplished. In two or three years at the most the American automobile will necessarily have been adapted to the best French solutions and my task will have been accomplished if I convince French manufacturers that they must not slumber on the sentiment of a superiority which will no longer be justified."

Faroux sees no reason to believe the United States is approaching the saturation point.



Paige model 8-85 five-passenger sedan

Paige 6-75 Fitted *With* Vibration Damper *and* New Manifold

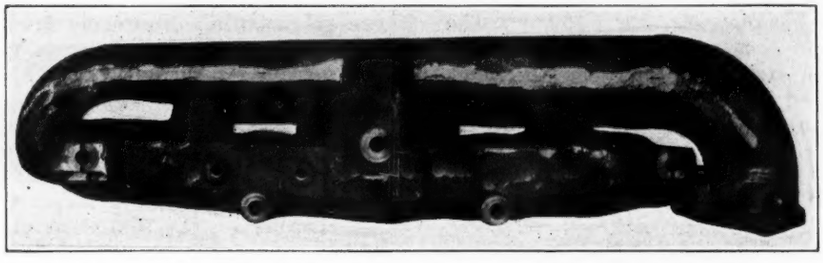
Oil filter and rubber engine supports also added. Compression ratio of 6-45 increased. Air cleaner standard on eight-cylinder model. New color schemes are adopted.

By A. F. Denham

PAIGE MOTOR CAR CO. has announced a number of refinements in design in addition to the price changes which were published last week (page 207).

Adoption of a new design manifold, rubber engine supports, an oil filter and a Lanchester vibration damper on the 6-75 are among the six-cylinder power plant changes. On the cars now coming through, the inlet and exhaust manifold are cast in one piece, with a cored exhaust gas jacket partially surrounding the central part of the inlet manifold. In the inlet manifold, which is of the four port type, all sharp corners have been eliminated. The exhaust manifold increases in diameter from rear to front, the exhaust pipe being attached (as formerly) at the front end. This gradual increase in diameter is said to have materially improved engine performance—by preventing the building up of back-pressure near the front cylinder exhaust ports.

Four-point engine support is now used on all sixes, with rubber "insulation" on the 6-65 and 6-75. The front supports have the U. S. rubber mounting, while the rear supports are of the trunnion type. A forged steel bracket bolts to the engine on each side, this bracket having a cylindrical trunnion, fitting into the sleeve of a malleable iron bracket riveted to the frame. Metal-to-metal contact is prevented by the use of a rubber bushing flanged at one end, and a rubber washer at the outer end. The design is such that the rubber washer and the flange on the bushing are not under compression when assembled. A feature of this mounting is that the engine can be removed without disturbing the rubber mounting.



This new one-piece intake and exhaust manifold adopted on Paige sixes has all sharp intake curves eliminated. Note gradual increase in diameter of exhaust manifold and split at ends to provide for expansion. Production manifolds have a porcelain finish

Radiator mounting on the 6-65 and 6-75 has been changed also. Formerly the radiator cores were bolted down to the front frame cross-member. They are now hung inside the shell and the shell is fastened down. A double V-type brace rod is used on these models to locate the top of the radiator shell. An interesting little feature on the cars is the provision of a hood support on the cowl, so as to prevent marring the finish when opening the hood.

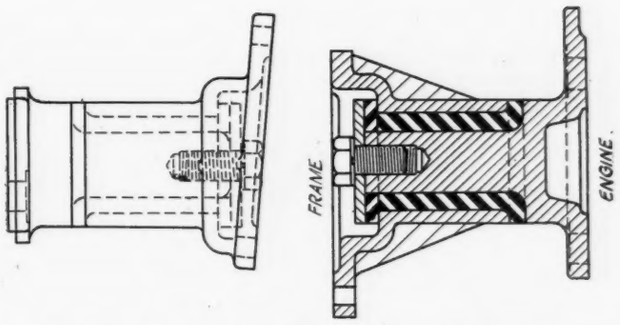
A change in the ignition system, consisting in advancing the setting of the ignition unit by two degrees, which was rendered practical by the change in the manifold design, has resulted in increased power and better acceleration.

A nickel-plated spark plug wire conduit has been adopted to protect the cables against mechanical injury. Nickel plating is being used also for such parts as radiator hose clamps, etc., to

prevent rusting. The only change within the engine is a slight increase in the compression ratio of the 6-45, obtained by decreasing the combustion chamber height 1/32 in. An air cleaner is standard equipment now also on the eight.

20-in. Wheels

Twenty-inch wheels are now fitted on the 6-65 models, these taking 30 by 5.25 balloon tires, decreasing the overall height of these models. Lower top lines and changed window reveal contours tend to emphasize the appearance of reduced height on all body models. Backs have been rounded off at the top and visors have been shortened to improve external appearance. New color schemes are used throughout, a new style instrument board has been adopted and the interior finish has been materially improved through the use of new upholstery, built-in arm rests, and improved paneling. Mohair is used on the closed six-cylinder models and broadcloth on the eights.



Section of rubber insulated rear engine support on Paige 6-75

Daimler in Production on Smaller Double Six

By M. W. Bourdon

THE Daimler Co., Coventry, England, which prior to the Olympia show last year introduced a 12-cylinder model of 435 cu. in., has gone into production with a smaller model having the same number of cylinders but a cubic capacity of 228 cu. in. (2.56 by 3.70 in.). To distinguish between the two models the larger one is henceforth to be called the Daimler Double Six "50" and the smaller the Double Six "30."

The engine of the new Double Six "30," like that of the larger model, has two banks of six cylinders set at an angle of 60 deg. on the aluminum crankcase. Valves are of the Knight steel sleeve type. The cylinders, pistons and certain other components are interchangeable with those of the 16-55 hp. six-cylinder model, which has the same bore and stroke. Although the cylinders are cast as a block each one has a separate detachable head. There are two carburetors, one for each bank of cylinders on the outsides of the blocks, the exhaust manifolds being in the Vee. Both magneto and battery-coil ignition are provided.

The seven-bearing crankshaft is fitted with a Lanchester vibration damper at the front end, and aluminum alloy pistons are used. The main connecting rods are forked and the small rods for sleeve operation are of duralumin. At the front end of the crankshaft are two transverse shafts on ball bearings and driven by helical gearing; the lower one drives a water pump at each end and the upper one two magnetos, while leading up from the same transverse shaft, driven by bevel gears, are two vertical shafts for the distributors of the coil ignition.

Engine and Gearset Separate

The engine and four-speed gearset are separate, with dual fabric disk joints in the coupling shaft. The clutch is of the single-plate type. Central control for the gearshift is provided, though the hand brake lever is on the right of the driver and operates an internal transmission brake. The brake pedal actuates the four-wheel brakes through a Dewandre type vacuum servo.

Through an open propeller shaft with ball bearing universals, the drive is conveyed to Lanchester worm gearing below the rear axle; four optional gear ratios are available, ranging from 4.8 to 1 to 5.8 to 1, the indirect ratios of the gearset in each case being, 3rd, 1.6; 2nd, 2.5; 1st and reverse 4.0. Wire wheels are fitted, with tire sizes ranging from 31 x 5.25 to 33 x 6.75 in. Six wheels and tires are included in the equipment. These differences in tire size, and also those relating to gear ratios, are accounted for by the fact that four distinct chassis sizes are being made with wheelbases ranging from 131 to 145 in. and the track from 52 to 60 in. These varying chassis dimensions afford body space (dashboard to rear axle) ranging from 85 to 102 in. in length. In this connection it is of interest to note that the whole of the Daimler chassis line, both six and 12-cylinder models, is based entirely upon body space and the symbol attaching to each model signifies that factor.

Steering Gear Unusual

Reverting to the chassis details of the new Double Six, the steering gear arrangement is unusual, though it resembles that of the larger Double Six. That is to say, the gear casing is bolted to the rear face of the aluminum dashboard, and the lever attached to the worm wheel shaft projects horizontally forward through the dashboard, whence a link depends to a bell-crank supported by a bracket on the side member of the frame. The vertical arm of the bell-crank serves in place of the usual drop-lever, being connected to the drag link. This arrangement economizes space under the hood on the right of the engine and keeps the steering column well above the pedals.

The chassis prices of this new model range from £1,130 to £1,430; by comparison, the chassis of the larger type range in price from £1,850 to £1,950. Examples of complete car prices for the smaller type are: Sedan, £1,645; inclosed drive limousine, £1,670, £1,970 and £2,180.

A point of detail is that, to distinguish the 12-cylinder Daimlers from the six-cylinder models, a central bar runs down the center of the raidator, though the latter, apart from this, does not depart in any way from Daimler characteristics, of which a notable example is the provision of longitudinal fins on the top tank.

Mercedes-Benz Wins *German* Grand Prize *for* Stock Cars

Covers 316 miles on "Nuerburg Ring" at average speed of 63.39 m. p. h. Woman wins event for cars between 91 and 183 cu. in. displacement. Fewer entries than last year.

By Edwin P. A. Heinze

THE races for the German Grand Prize for Stock Cars were held this year on the new road circuit in Germany's Rhineland called the Nuerburg Ring, although it is not a "ring" at all but a very irregular and mountainous course with some 170 corners and having a length of 17.56 miles. It is a wonderful track and appears destined to become one of the chief circuits for automobile racing in Europe.

This year's event did not draw so many entrants as last year's, when 46 cars were listed, of which 38 started. Foreign makers took no notice at all of this year's race and of German makers only a single one, Daimler-Benz, sent in a team. All European makers appear heartily tired of racing.

This year 26 cars had been entered but only 20 of them came to the start. The races were limited to stock cars which were divided in three groups, the first for a piston displacement above 183 cu. in., the second for 91 to 183 cu. in. and the third for cars up to 91 cu. in. Prizes were awarded to the three entrants of the cars that finished first in each group, and the fastest car of the three groups received the grand prize.

The first group consisted of eight cars, seven of which were Mercedes-Benz, the product of the Daimler-Benz Co., the eighth being an Austrian Steyr driven by von Guillaume. This car was almost two litres smaller than its rivals, but nevertheless it succeeded in attaining fourth place.

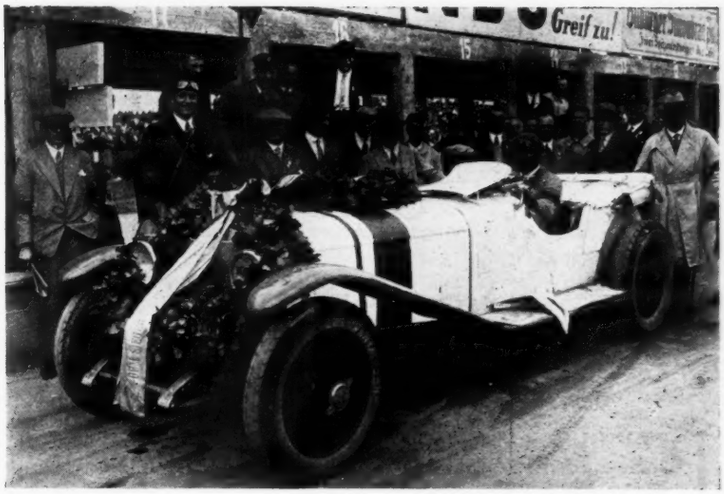
It is a great pity the Frenchman Boillot, who had entered a Peugeot car and had actually participated in the training, decided almost at the very last moment to pack up and go home. The reason probably was his car, like the Steyr, was handicapped by having a considerably smaller volume than the Daimler-Benz cars.

The first man home and also the winner of the grand prize was Otto Merz, who went over the 316.19 miles in 4 hr. 59 min. 35.6 sec., averaging 63.39 m.p.h. The second man was Werner, who lapped the course once at record speed but later lost much time in changing wheels. Third place was won by Walb.

All of the Mercedes-Benz cars were of the new "S" model with a piston displacement of 414.98 cu. in. The engine is provided with a supercharger and has six cylinders of aluminum alloy cast in one block together with the upper half of the crankcase and the water-

Cars lined up on the Nuerberg Ring for the start of the German Grand Prize for Stock Cars

Right—German Grand Prize winner, Otto Merz in his Mercedes-Benz
Below—Mrs. Junek, who won the event for cars of 91 to 183 cu. in. displacement in a Bugatti



jacket. The bore is 3.85 in. and the stroke 5.90 in. Each cylinder is provided with a cast iron insert. The valves hang in the detachable head and are operated by an overhead-camshaft. There are two plugs for each cylinder, ignition being by means of a Bosch magneto and double distributor. The engine speed is relatively low at 3000 r.p.m.

While these engines stood up well in the race, the four-speed gearboxes gave trouble. Two famous drivers, Caracciola, last year's victor, and Rosenberger, who were leading for the first six laps, were forced to retire from this cause. Another Mercedes-Benz retirement was due to the car running out of petrol and a fourth arose from the petrol feed system getting out of order. The race was very hard on the tires and much time was lost in replacements. Some drivers, especially in the smaller groups, changed all wheels as often as three times. Another frequent cause of stoppage were the plugs.

In the second group (91 to 183 cu. in.), six cars started, of which only two finished, the winner being a woman driver, who has repeatedly won important Continental races. She is Mrs. Junek of Prague, the wife of a banker, who is himself a keen sportsman. Mrs. Junek drove an eight-cylinder Bugatti of 121.4 cu. in. piston displacement. She was very much handicapped by tire failures and would actually have been second behind Baader on a supercharged Bugatti but for the disqualification of this driver, who had replenished his oil in a prohibited manner.

Goes Over Embankment

For the first three laps Mrs. Junek's fiercest opponent was Kappler on a supercharged Bugatti, who after a stay at his depot to see to his tires, however, sped up rather too fast to catch her and made a spectacular leap over the embankment of a curve. Fortunately neither he nor his companion was seriously hurt. Kappler seems ill-starred this year, for he had only just recovered from a more serious accident in another race.

The Frenchman, Pierre Clause, in a Bignan, and the other two drivers could not finish the race at all, so Mrs. Junek, who also had the fastest lap of this group to her credit (61.5 m.p.h.), well deserved her victory. Her speed was 55.9 m.p.h.

The third group of cars comprised also six, every one of different make. Urban-Emmerich of Prague, a well known sportsman, driving a Talbot with supercharger of 91.5 cu. in., was the winner. He attained an average speed of 52.6 m.p.h. Second was the German driver Cleer in an eight-cylinder Bugatti of 90.83 cu. in. volume, but all other drivers, including the Frenchman de Joncy in a B. N. C., Doerper in Opel, Stumpf in Hag-Gastell (German make) and Reich in a supercharged Pluto, did not finish, the latter coming to grief in the first lap when his car turned over. He was injured.

New London Bus Seats 104

FOLLOWING upon the official sanction for the use of six-wheeled inclosed top deck buses in London, The Associated Daimler Co., Ltd., the manufacturing subsidiary of the London General Omnibus Co., has produced a six-wheeler seating 104 passengers, as compared with seats for 68 provided by the type of vehicle of which official approval has been secured and which was described in *Automotive Industries* of July 16.

The large capacity bus is at present being run experimentally under the surveillance of the London licensing authorities, its work being that of conveying members of the A.D.C. staff to and from the new plant at Southall in West London.

So far as its general design is concerned the 104-seater resembles the 68-seated bus. It has a 60 hp. six-cylinder engine of 108 x 140 mm. bore and stroke, magneto ignition, Zenith carburetor, thermo-siphon water circulation with thermostatic control, and pump and trough lubrication. The engine, alongside which the driver has his seat on the right, is carried on a sub-frame mounted on rubber pads. The clutch is a single-plate, while the separate gearbox has four speeds on ball bearings with spherical housings. The transmission system to the four rear wheels embodies the differential acting between the front and rear sets, as in the case of the 68-seater, and the final transmission is likewise by worm gearing and internal gear drive to the wheels. Four-wheel brakes are fitted, operated by a vacuum servo.

The body is a double-decker with inclosed top deck and sliding windows at each side of both saloons. There are 59 seats in the upper saloon and 45 in the lower.

OFFICIAL statistics concerning the number of motor vehicles of different types in service in Italy at the end of 1925 were published only recently. At that time there were running in the kingdom 48,325 motorcycles, 12,926 motorcycles with side cars, 75,842 private passenger cars, 8984 public passenger cars, 2878 postal motor cars and 1904 motor boats.

Three Types of *Chromium Bath* Give *Same* Plating Results

Acid, neutral and basic solutions all reach exactly the same composition when operated under the same conditions. Additional light on process.

PREVIOUS information on chromium plating has been added to materially by the publication of Technologic Paper No. 346 of the Bureau of Standards, on Electrodeposition of Chromium from Chromic Acid Baths, by H. E. Haring and W. P. Barrows. Messrs. Haring and Barrows give an historical summary of work on chromium deposition, which shows that it was first accomplished by Bunsen in 1854. A thorough survey of the work which had been done prior to 1905 was made in that year by Carveth and Curry at Cornell University. Certain of the earlier investigators of the subject had been unable to obtain any results, and they had claimed that it was impossible to deposit chromium from chromic acid solutions, but Carveth and Curry showed that they were wrong and that their mistake lay in using too low current densities. Carveth and Curry also found that the chromic acid used for electrodeposition experiments had always contained some sulphate, and that this impurity facilitated the deposition of chromium. Haring and Barrows state in this connection that it is impossible even at the present time to obtain chromic acid entirely free from sulphate.

Sargent's Investigations

Sargent of Cornell University in 1920 published the results of some investigations made by him several years earlier. He had found that the efficiency of chromium deposition from chromic acid baths increased with electrolysis. He concluded that this increase in efficiency resulted from the replacement of the sulphuric acid in the original bath by chromic sulphate as a result of the electrolytic reduction, and he therefore proposed to introduce the chromic sulphate in the bath at the start.

In June, 1925, the successful application of electrodeposited chromium to printing plates at the United States Bureau of Engraving and Printing was announced and the method was fully described in a paper read at the annual meeting of the American Electroplaters Society. In this paper the author expressed the opinion that more satisfactory results than had so far been obtained with Sargent's solution would be possible if chromium chromate were included as an initial constituent of the bath. Chromium chromate is a compound of hexavalent chromium, the first reduction product of chromic acid, the presence of which in colloidal form had been noticed by Sargent and previous investigators in solutions which had been electrolysed for a time and from which satisfactory chromium deposits had been obtained.

From 1905, when Carveth and Curry proved that chromium could be deposited from chromic acid containing small amounts of sulphuric acid or a sulphate, there has been a trend from their "acid" type of bath containing initially free sulphuric acid and chromium of the valence of 6 only, to the "neutral" type of bath, usually referred to as Sargent's solution, in which the sulphuric acid is replaced by chromic sulphate, and to the "basic" type of bath, which is simply Sargent's solution plus a small amount of chromium chromate. The compositions of the three baths are as follows:

1. (acid bath)—Chromic acid ($Cr\ O_3$), sulphuric acid.
2. (neutral bath)—Chromic acid, chromic sulphate.
3. (basic bath)—Chromic acid, chromic sulphate, chromium chromate.

The effect of a change in the sulphate content on the character and efficiency of the deposit, for each of the three solutions, was first studied. The CrO_3 content in all cases was 250 gm. per liter (2.5M) and the quantity of chromic carbonate added to produce the basic bath was 7 gm. per liter. Solutions of these compositions containing increasing amounts of sulphate were electrolysed, using steel cathodes, at a temperature of 45 deg. C. (113 deg. F.) and a cathode current density of 10 amps. per dm. 20.645 amps. per sq. in. for one hour.

Results with the neutral and basic type baths were identical (as regards both appearance and efficiency), with those obtained from the acid type. With the acid type bath bright deposits were obtained for a sulphate content range of 0.035 to 0.135 normality, the highest cathode efficiency being obtained with a sulphate content of 0.045 N. Tests were made also at other bath temperatures and other current densities, and the results indicated that with respect to efficiency the optimum sulphate content for a bath of the chromic acid content specified is in all cases approximately 0.05 N. However, the optimum sulphate content with respect to character of deposit varies with the bath temperature and the current density.

Electrode polarization, solution resistivity, and cathode efficiency were determined simultaneously, and successively for the acid, neutral and basic types of bath, and the results are given in the paper in the form of tables and charts.

Comparative Study Made

In order to determine the effect of changes in concentration on the character of the deposit and the efficiency of deposition, a comparative study was made of baths which were, respectively, 0.75, 2.50 and 5.00 M in CrO_3. It was found that the optimum sulphate content in all cases bears a definite relation to the CrO_3 content, which may be expressed by the equation

$$CrO_3 \text{ molarity}/SO_4 \text{ normality} = 50$$

For CrO_3 and H_2SO_4 this is equivalent to a weight ratio of 100 to 1. A decrease in CrO_3 concentration is accompanied by a desirable increase in efficiency, but also by an undesirable increase in resistivity. In the past baths of moderate concentration, such as 2.5 M,

have been most frequently used, because it was considered desirable to have a high efficiency, even though higher voltages are required, and the authors from results with other densities formed the opinion that plating baths of about this concentration will continue to be most generally used.

Experiments were made also in which quantities of chlorides, nitrates, fluorides, phosphates and borates were added to the bath, which in some cases had proved satisfactory substitutes for sulphates. The authors say it seems logical to assume that the only essential ingredients of a chromic acid plating bath (for depositing pure chromium) are CrO_3 and any anion which will not be decomposed or precipitated by chromium in any of its valences. The form in which this anion is added, whether in combination with hydrogen (as an acid) or with metals ordinarily considered more negative or more positive than chromium, seems theoretically to be of no consequence, provided only that the metal added is not itself deposited. No attempt was made, however, to prove this theory.

Results are Summarized

The investigation also covered numerous other questions that arise in connection with chromium plating and the results obtained are summarized in the following conclusions:

1. The three principal types of chromic acid plating bath which have been employed in the past, namely (1) the "acid" type which as definitely proposed in 1905 by Carveth and Curry contains chromic acid and sulphuric acid, (2) the "neutral" type, which, as recommended by Sargent in 1920, consists of chromic acid and chromic sulphate, and (3) the "basic" type, which is Sargent's solution plus a small amount of "chromium chromate;" are identical, not only in initial behavior but also in ultimate composition. All of these solutions when operated under the same conditions reach exactly the same composition, which may be "acid," "neutral," or "basic," depending on circumstances.

2. The recent industrial success of chromium plating must, therefore, be attributed, not to any improvement which has been made in the bath, but to its more careful operation and control.

3. The only essential constituents of a chromic acid plating bath are CrO_3 and any anion which will not be decomposed or precipitated by chromium in any of its valences.

4. It is most logical to use the sulphate ion (unless some other anion is subsequently shown to be superior) because it invariably exists as an impurity in even the purest commercially available chromic acid.

Sulphuric Acid Preferable

5. To exclude nonessential cations from the bath, the sulphate should be introduced in the form of sulphuric acid or chromic sulphate. Of the two, sulphuric acid is preferable because of its known purity.

6. The CrO_3 employed in the preparation and maintenance of chromic acid baths should contain no more than 0.5 per cent of SO_4. A number of samples of the so-called 98 per cent chromic acid of commerce have been found to satisfy this requirement. It is, of course, also desirable that the CrO_3 be free from insoluble matter.

7. If chromic sulphate is used to furnish the SO_4 ion, its sulphate content should be determined and additions made on that basis. It should be readily soluble in cold water.

8. To insure not only a bright chromium deposit but also maximum efficiency the CrO_3 and SO_4 should be present in the bath in the approximate ratio of $\frac{CrO_3 \text{ molarity}}{SO_4 \text{ normality}} = 50$. Expressed in terms of concentrations by weight of CrO_3 and H_2SO_4 this proportionality becomes $\frac{CrO_3}{H_2SO_4} = 100$.

9. The CrO_3 content of the bath decreases more rapidly than the SO_4 content, and to restore a used bath to its original concentration it is therefore necessary that the ratio of CrO_3 to SO_4 added be greater than that used in the preparation of the bath.

10. Baths of moderate concentration, for example, 2.5 *M* in CrO_3 and 0.05 *N* in SO_4 are most suitable for general purposes. Formulas for such a bath in terms of chemicals of 100 per cent purity are given below:

	g/L	oz./gal	
CrO_3	250	33.5	(1)
H_2SO_4	2.5	.34	

or

CrO_3	250	33.5	(2)
$Cr_2(SO_4)_3$	3.3	.44	

Both of these solutions have been in use at the Bureau of Engraving and Printing for a long period and have yielded equally satisfactory results.

11. "Chromium chromate," or more properly chromium dichromate, serves no useful purpose in a chromium plating bath. The formation of this colloid is accompanied by a corresponding decrease in free chromic acid and, hence, in conductivity; any appreciable accumulation of it is therefore objectionable and should be avoided.

12. Chromic carbonate and similar basic compounds and also reducing agents have been added to chromic acid plating baths for the express purpose of forming "chromium chromate." In view of the fact that this colloid should be excluded from the bath rather than included in it, such additions are not only unnecessary but actually detrimental.

A Fortunate Accident

13. The chromium plating bath originally used at the Bureau of Engraving and Printing gave results equal to any which are now obtained, not because it contained "chromium chromate," but because as was subsequently learned, sulphate was present as an impurity in the chromic carbonate used in preparing the bath, in exactly the right concentration to raise the sulphate content of the bath to the optimum for the conditions used.

14. Insoluble anodes composed of a metal upon which the overvoltage of oxygen is high are most suitable for use in chromic acid baths.

15. The anode area should be as large as is conveniently feasible.

16. Lead anodes are entirely satisfactory. If they are of sufficient area their use is accompanied by the formation of at most only a negligible amount of "chromium chromate."

17. Continued use of iron anodes results in an objectionable accumulation of "chromium chromate."

18. If chromium anodes are to be used in chromic acid baths some means of preventing excessive formation of "chromium chromate" must be found.

19. In the absence of an appreciable amount of "chromium chromate" analysis of a chromic acid bath involves only the determination of its specific gravity and sulphate content. If a large quantity of the colloid is present, however, a complete chemical analysis is necessary.

20. In the deposition of bright chromium as well as of other metals, the optimum operating conditions (bath temperature and cathode current density) are de-

termined not only by each other, but also by a number of variable factors, such as bath composition and concentration, and the composition and structure of the cathode. In consequence, it is impossible to specify a definite range of operating conditions which will give universally satisfactory results. Any statement as to the optimum operating conditions for chromium plating is therefore meaningless unless properly qualified.

21. If a bath 2.5 *M* is CrO_3 and 0.05 *N* in SO_4 is used, most metals can be satisfactorily plated at temperatures ranging from 40 to 60° C. (104 to 140° F.) providing that a suitable current density is employed in each case.

22. If it is desired to deposit bright chromium the optimum average current density for the bath temperature involved should be employed. By "optimum average current density" is meant that current density which lies halfway between the lowest current density resulting in a frosty area on the "work" and the highest current density resulting in a milky area. (Such data must be determined empirically for any given conditions.)

23. The optimum average current density for a given bath and temperature varies widely, depending upon the nature of the metal which is being chromium plated. For example, if a bath 2.5 *M* in CrO_3 and 0.05 *N* in SO_4 is employed at 50° C. (122° F.), the optimum average current density for steel or nickel is 16 amp. /dm^2 (149 amp./sq. ft.), while for copper or brass it is 25 amp./dm^2 (232 amp./sq. ft.).

24. The cathode efficiencies at which bright chromium deposits are produced are nearly equal, regardless of whether a low temperature and current density are used or a high temperature and correspondingly higher current density. The time required to deposit a given thickness of chromium is therefore approximately inversely proportional to the cathode current density. For maximum production it is hence desirable to use current densities and bath temperatures as high as are otherwise permissible.

25. It is doubtful whether the throwing power of the chromic acid plating bath can ever be decidedly improved by the necessarily limited changes which can be made in its composition.

26. Irregularly shaped articles composed of metals upon which the overvoltage of hydrogen is high can be more readily completely plated with bright chromium than those composed of metals upon which the overvoltage of hydrogen is low. For example, recessed articles of copper or brass are decidedly easier to plate with a bright chromium deposit than are those of steel or nickel.

Applied on Other Coatings

27. When chromium is plated upon even a thin electrolytic coating of some other metal, the results obtained are identical with those which would be obtained if the cathode consisted entirely of that metal. In other words, the character of a chromium deposit is influenced by the nature of the cathode surface, and not of the underlying metal.

28. Irregularly shaped articles composed of metals of low hydrogen overvoltage, such as steel, can be more readily completely plated with bright chromium if they are first lightly coated with a metal of high hydrogen overvoltage, such as copper.

29. To prevent the attack of metals, such as brass and copper, by the chromic acid, it is essential that the cathode be introduced into the bath in such a manner that its immersion closes the plating circuit. This procedure also improves the throwing power on metals, such as iron and nickel, that become passive in chromic acid. The throwing power upon the latter metals can be still further improved if the article to be plated is polarized anodically for a minute or two previous to plating.

30. Although minor improvements may be effected in the distribution of chromium upon objects of irregular shape by variation of numerous factors in the process, the successful plating of such articles will probably continue to depend chiefly upon ingenious arrangements of the "work," the racks, and the anodes.

How Much for a Car?

"What should I pay for a car?" asks Remsen B. Ogilby, president of Trinity College, in a bulletin written for the Connecticut department of motor vehicles. "We might begin," he continues, "by enumerating the items on the credit side of the new car. First is the actual saving on regular expenses of transportation, such as daily carfare to and from the job. Then there is the saving of transportation on special occasions that might involve taxi hire, the party on a rainy night, meeting a friend at the station, a hurried trip to the doctor's office. Under this heading would also come railroad expenses, when individuals or the whole family go off for summer vacations. And more important yet may be the increased radius of business opportunity. An automobile makes it possible for a man to do his work better over his usual circle or else to do more work over a larger circle. Not all men need an automobile in their business, but there are few whose efficiency is not greatly increased by the mobility that independent transportation provides. This means especially the saving of time on crowded days when appointments almost overlap and where various engagements call upon a man to be in two places at the same time. Finally, we should figure in the contribution the automobile may make to the health of the whole family, making possible outdoor excursions on many occasions and bringing field, forest, beach and mountain close to the very door. Sixty-seven per cent of the motor mileage in this state is for pleasure only.

"It is possible for an intelligent head of a family to jot down an approximate value for these four items on an annual basis, perhaps even adding a vague estimate to be charged up to "satisfaction" or "family pride."

"Here is an example of such computation, based partly upon the personal experience of the writer but more upon certain statistics which are available.

"Items to Credit of Car for the Year:

Saving of family carfare	$120.00
Saving of taxis and hired cars, including railroad fares for vacations	130.00
Increased radius of business opportunities (a widely varying figure)	300.00
Health for the whole family	250.00
"Total credit for the year	$800.00

"Now take up the operating cost of a car. A few automobile owners are accustomed to work out such figures; it is a pleasant form of indoor sport. For example, figuring on an estimated mileage of 10,000 miles a year, the operating cost will be about $530 a year.

"We have therefore an annual credit to the automobile of $800 and an annual upkeep cost of $530. The difference, $270, is the amount that can be put down in the yearly budget toward an automobile."

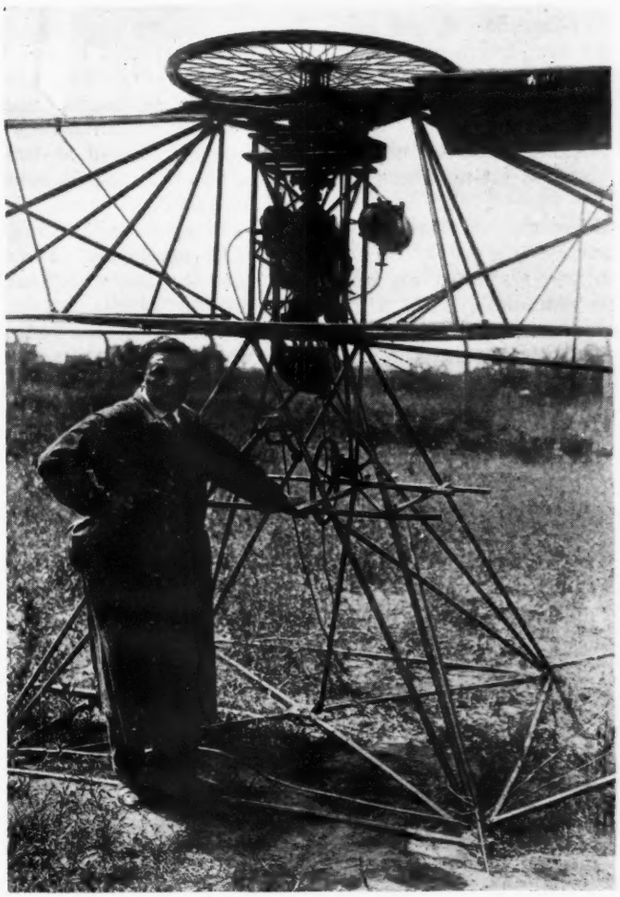
"Rotating Plane" Designed for Safe Landing in Case of Failure

Gyroscope rotating in horizontal plane insures stability of the machine while in the air and enables operator to glide down. Car weighs slightly over 800 lb.

By Edwin P. A. Heinze

A PROMISING start in the direction of further helicopter development has been made by a German engineer, Engelbert Zaschka. He has for many years past studied the problems involved in the building of various types of flying machines, especially helicopters.

Instead of helical-shaped lifting screws, Zaschka uses a comparatively large rotating plane with an area of 92 sq. ft. Each of the two halves has its own angle of incidence, which can be adjusted during the flight, thus admitting of close regulation of the lifting force. The two wings are supported by a framework of tubes, which rotates around a framework turret projecting above the body or car of the machine.



Zaschka and his rotating airplane

The characteristic feature of Zaschka's machine which he calls a rotating airplane is, however, a gyroscope consisting of a large diameter wire wheel with heavy steel rim. This rotates in a horizontal plane in the opposite direction to the planes, at a speed of 1400 r.p.m. The shaft is concentric with the axis of rotation of the wings and is driven direct from the engine—a two-cylinder, air-cooled machine by Haake, developing 30 hp. at 1350 r.p.m. The rotating plane is not connected directly to the engine, but is geared to the gyroscope through an internal gear, and rotates at 100 r.p.m.

The function of the gyroscope is twofold: It insures the stability of the plane in midair and it enables gliding in the following manner: Supposing that the engine stops in midair, the pilot immediately pulls a lever and sets the wings to a negative angle. The wings of the falling machine now catching the wind, continue to rotate in the same direction as before, i. e., they are now driven like a windmill by the wind and, being geared to the gyroscope, the latter is driven by them, instead of vice versa. The pilot will simultaneously disengage a clutch connecting the engine with the shaft of the gyroscope (unless he hopes to get it going again by forcing it around by the power of the wind), and the more rapidly the machine falls, the quicker will the plane rotate and the more energy will be stored by the gyroscope. This latter is the vital point, for when the machine comes close to the ground the pilot sets the wings to a positive angle and the energy of the gyroscope, supplemented by that of the wings, will, for a short time, act as a source of motive power and create a lifting force sufficiently powerful to enable a smooth landing.

The wings measure 40 ft. from tip to tip and rotate over a circle with an area of 1256 sq. ft. and a circumference of 125.66 ft. As they revolve 100 times a minute, the tips thus rush through the air with a speed of 143 m.p.h. The lifting force created is considerable, and with the engine developing only 8 hp. it actually starts lifting the whole machine off the ground. As the machine with the experimental car weighs slightly over 800 lb., this amounts to the ratio of 100 lb. lifting power per horsepower.

Up to the time of this writing Zaschka's machine had not flown with a man aboard. The inventor's first object was the development of the right size and shape of the plane and of the gyroscope. This has been accomplished, and he will now proceed with the work of finding the best kind of horizontal drive. For the present he will use a horizontal shaft with an ordinary propeller.

Diamond Boring Proves Economical in *Locomobile* Production

Eliminates much expense incident to removing, resharpening and resetting of tools and insures greater accuracy. Design of fixtures is an important factor.

By N. A. Jagger
Manufacturing Superintendent, Locomobile Co.

FOR nearly five years the Locomobile Co. has been using diamond boring in the production of its cars and has found it to be a very satisfactory system, not only because of the great accuracy of the work turned out but also because of the long life of the boring tools, which eliminates a great deal of expense incident to the removing, resharpening and resetting necessary with other types of tools.

In boring both ends of connecting rods and later boring the bearings, and in boring the crankcase for main shaft and camshaft bushings, standard machine tools have been adapted for the diamond boring work. Although it is possible that specially designed machines might prove more efficient, the results obtained in this way have been remarkably good.

A most important part of diamond boring is the design of fixtures and boring bars, and considerable attention has been given to this item. The fixtures are made as rigid as possible. Bushings for the boring bars are carefully lapped to insure accurate alignment and correct fit. The bar bushings in the crankcase fixture are slotted to allow the diamonds to pass, a plunger pin which connects with a slot in the boring bar being mounted at the end of the fixture to guide the bar so that the diamonds are not injured by hitting the bushings.

In boring crankcase bushings the fixture shown in Fig. 1 is employed. The work is located by means of two dowel pins which are operated by an eccentric device, the handle of which may be seen extending across the top of the fixture. Operation of this handle lifts the work up so that the boring bars may be inserted without scoring the bores or injuring the diamonds.

The boring bars are fitted with wearing strips and the tools are adjusted in the bar by means of a 40-pitch screw at the back of the cutter and a locking screw on

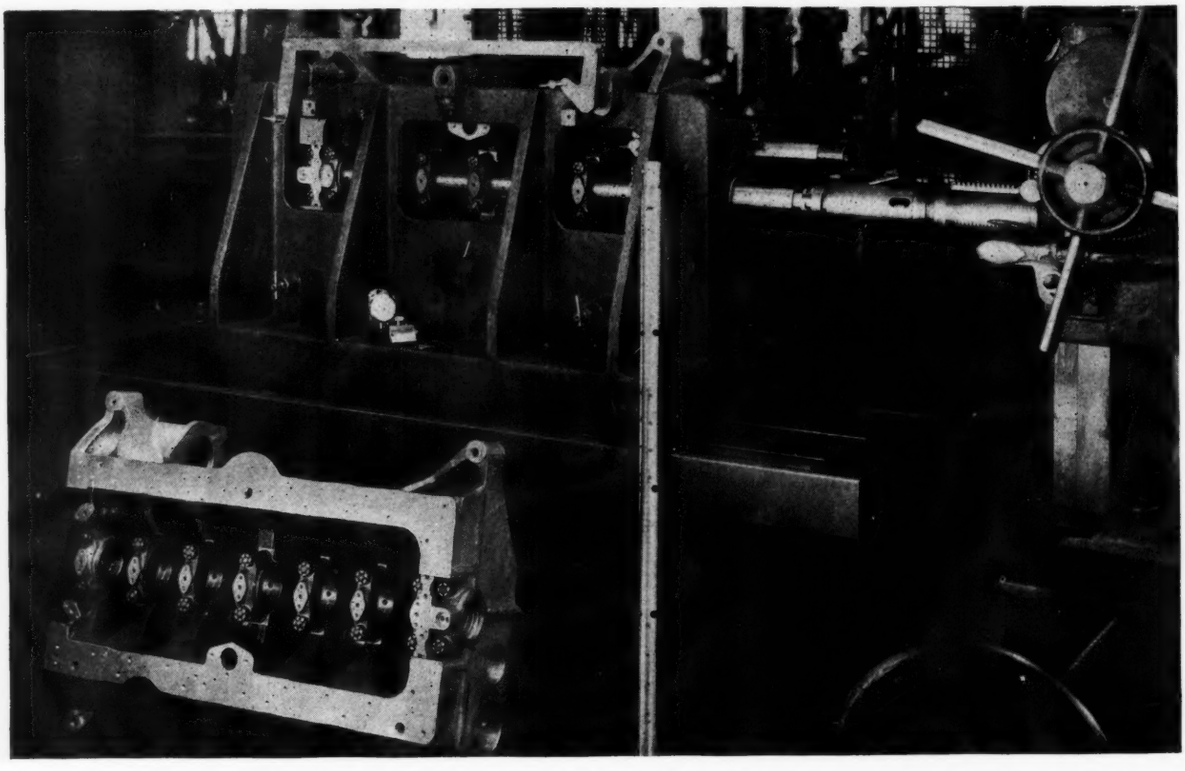


Fig. 1. Fixture and equipment used by Locomobile for diamond boring crankshaft bearings. Below is a crankcase. In front of the fixture is shown the indicator with which the diamonds are located for cutting

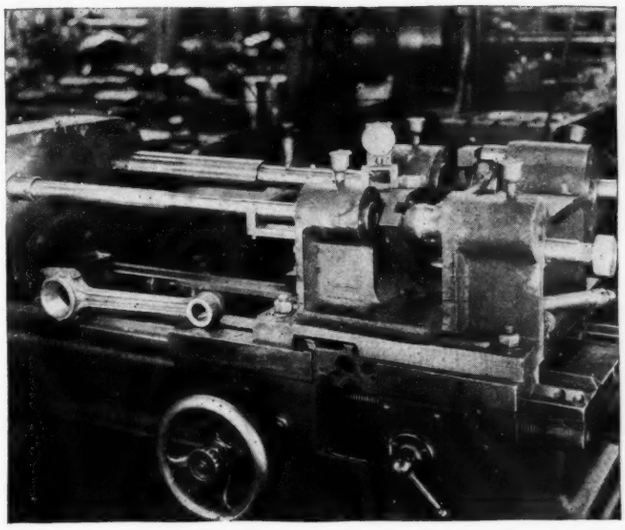


Fig. 2. A remodeled, two-spindle lathe is used for rough and finish diamond boring connecting rod bearings in a single operation at the Locomobile plant

top which forces the cutter back against the adjusting screw as well as securing it firmly to the bar.

A ground and lapped segment whose inside diameter is that of the boring bar and whose outside diameter is that of the hole to be bored is employed to set the diamonds in position. The segment is placed on the bar, adjacent to the cutter, and a reading is taken with a dial indicating device reading to 0.0001 in. which is mounted on a V-block. The diamond is then adjusted until the reading is the same as that obtained from the segment. Variations in hole sizes can be readily obtained by setting the diamond slightly above or below the indicated reading.

Diamonds used are both Bortz and Carbon. For babbitt the Bortz has given the best results, while for machining bronze and aluminum, the Carbon, when it has been of very close grain structure, has proved most satisfactory. Bortz gives very good results with any material and is better than a coarse or open grain carbon diamond.

Crankcases are of aluminum alloy with the first and last bearing caps of die cast aluminum and the other five of Government Specification bronze. It is in boring these two metals at a single operation and with the same cutter that the diamonds have proved particularly satisfactory. The tools cut so cleanly that there is no difficulty in keeping to correct sizes and there is no crowding over to the softer metal as would be the case if steel tools were used.

Crankshaft Liner Holes

The crankshaft liner holes are bored 0.006 in. undersize before coming to the diamond boring operation. The tools are run at 240 r.p.m. and the feed is held to about 0.005 in. per revolution. The seven crankshaft holes are bored at one operation and in the next operation the four camshaft holes are finished.

Crankshaft liners are then fitted and camshaft bushings are pressed in. Both liners and bushings are babbitt-lined and bronze-backed. They are finish bored in two operations, as before, 0.012 in. stock being removed in one cut. The bars are run at a speed of 270 r.p.m. in the finishing work, while the feed is about 0.0025 in. per revolution.

Except for touching up the ends of the bushings so that they will clear the fillets on the crankshaft there is no scraping necessary for the bearings after being diamond bored.

The fixture for boring connecting rods, shown in Fig. 2, is mounted on the carriage of a partially stripped lathe equipped with a two-spindle head for driving the boring bars and with reduction gearing for the feeding mechanism. The rods are forged of duralumin and are babbitted in the large ends and have Non-Gran bronze bushings in the pin end. They are first spotted off on the side which will bear against the fixture so that the effects of any warpage which may have occurred in previous operations will not misalign the holes.

Both ends are rough and finish bored simultaneously, the roughing cutters entirely clearing the work before the finishing cutters commence. For the large end, the roughing cutter is of high speed steel and 3/16-in. is removed from the bore. The finishing cutter is a diamond and it removes about 0.006 in. The boring bar for the big end is run at 520 r.p.m.

For the pin end of the rod both roughing and finishing cutters are diamonds. The roughing tool removes 0.010 in. and the finishing removes .004 in. The boring bar runs at 700 r.p.m. and the feed is approximately 0.002 in. per revolution. As is the case with the crankshaft bearings, no scraping is necessary on the connecting rod bearings after they leave the machine except for a slight touching up of the fillets.

With ordinary care diamonds have been run for three to six months without redressing, which, as may be imagined, means considerable in time saved from changing tools and resharpening them.

Automotive Research in England

AMONG the several industrial research associations in Great Britain which receive financial support from the government is the Research Association of the British Motor and Allied Manufacturers.

This association is said to have accomplished work that has been of great technical value to its members, but owing to financial reverses of some of the members and other occurrences it now appears that the Association may have to be reorganized and the case for cooperative research in the automobile industry restated.

From a report of the Council for the year which ended March 31, 1927, it is seen that the Association is supported by nine firms making motor vehicles and by a like number supplying fittings, steel and other materials. Three companies that were in the Association last year have passed through the hands of liquidators and amalgamations and working agreements have been effected between others, with the result that conditions in the industry as they affect cooperative research are totally different from what they were two or three years ago. For the second five-year period of its existence the Association entered into an agreement with the Department of Scientific and Industrial Research for the payment of block grants on a diminishing scale. It was stipulated in the agreement that the annual expenditure on research apart from depreciation was to be not less than £6,000, and that the income of the Association was to increase progressively to £5,400 per annum. It became clear that the prescribed subscription income could not be realized, and that the needs of the members could be met by an expenditure of much less than £6,000 per year. It was therefore decided to terminate the agreement with the Department on March 31, 1927.

The Case for a Differential Gear Between Axles in Six-Wheelers

Differential between driving axles seems justified only for vehicles that are driven usually on smooth pavements at moderate speeds.

By P. M. Heldt

IN the latest design of six-wheeled omnibus for London service, and also in another recent British six-wheeled design, use is made of three differential gears—one in each of the driving axles, chiefly to allow for the unequal speeds of wheels on opposite sides when turning corners, and another in the drive to the two axles, to take care of any possible difference in the mean effective diameters of the wheels on the two axles respectively.

This step by British designers naturally has raised the question as to whether this third differential is needed, and under what conditions it is most needed.

If the effective radii of all four driving wheels were at all times exactly alike there would evidently be no need for a differential between axles, but differences in diameter occur as a result of differences in the states of wear and in the degrees of inflation of the different tires. If the wheels on one axle have an appreciably smaller effective diameter than those on the other, since both sets must turn at the same speed and also progress over the road at the same rate, one set evidently must slip. Compensation could result from the smaller wheels slipping forward over the road or the larger wheels slipping backward, and, as a matter of fact, equal forces are exerted on the two pairs of wheels, tending to slip the smaller wheels forward and the larger wheels backward.

Let us see just what happens when the mean effective diameter of the wheels on one of the driving axles is smaller than that of the wheels on the other axle. We will assume that the connection of the axles to the chassis frame is such that when the vehicle is standing still the loads on both axles are equal, and that such an arrangement of torque members is used that this equal division of the load is not greatly disturbed when the vehicle is being propelled along the road. We will further assume that the vehicle is traveling at low speed, so there is no appreciable variation of the pressure between individual wheels and the ground due to road shocks.

To begin with, it is obvious that all of the useful propelling effort must come from the wheels of larger diameter, for even if all of the necessary slippage occurs at these wheels, the peripheral speed of the smaller wheels will be barely enough to enable them to keep up with the motion of the vehicle. Instead of exerting a backward pressure against the ground, which is necessary to produce the useful propelling effort, they actually produce a force in the opposite direction. Referring to Fig. 1, in addition to the force R required to overcome the traction resistance to pure rolling motion, there are the two oppositely directed forces on the two pairs of wheels, already referred to, which are due to the unequal circumferential speeds of the unequal wheels. In the diagram these are denoted by r and r_1.

Now assume that the vehicle moves through a distance D and that the larger wheels have a diameter a per cent greater than that of the smaller ones. Also let W be the total weight of the vehicle; t, the traction resistance coefficient, in pounds per thousand; and f the coefficient of friction of the tires on the road surface. We will assume that 30 per cent of the total weight is carried on the two front wheels and 35 per cent on each pair of rear wheels.

The energy consumed in moving the vehicle a distance D, assuming free rolling motion, would be

$$E_1 = W \times (t/1{,}000) \times D = 0.001\ W\ D\ t\ \text{ft.-lb.}$$

and the energy consumed in slipping one pair of wheels

$$E_2 = 0.35W \times f \times a/100 \times D = 0.0035\ W\ f\ a\ D\ \text{ft.-lb.}$$

Hence the total energy spent is

$$0.001\ W\ t\ D + 0.0035\ W\ f\ a\ D\ \text{ft.-lb.}$$

All of this energy was developed at the circumferences of the larger wheels, which moved through a distance $D\ (1 + a/100)$.

The force at the circumference of the large wheels

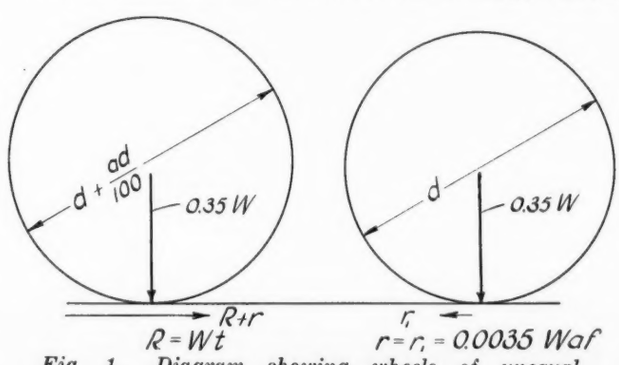


Fig. 1. Diagram showing wheels of unequal diameters

therefore is

$$\frac{0.001\,Wt+0.0035\,W\,f\,a}{1+a/100}\ \text{lb.},$$

whereas if the vehicle had only a single driving axle the circumferential force on the wheels of this axle would be 0.001 *Wt*. To get an idea of the actual values let us assume that $t=20$ lb. per thousand; f, 0.6 and a, 1 per cent. We then get for the circumferential force on the larger wheels of the six-wheeler

$$\frac{0.001\,X\,W\,X\,20+0.0035\,X\,W\,X\ 0.6\,X\,1}{1+1/100}=0.022\,W\ lb.$$

as compared with $0.001XWX20=0.020W$ for the circumferential force on the two driving wheels of a four-wheeled truck.

Hence, if one pair of driving wheels of a six-wheeler has an effective diameter 1 per cent larger than the other, these larger wheels will not only exert the entire driving torque required to propel the vehicle, but about 10 per cent additional torque—which is necessary to overcome the negative torque on the wheels of smaller diameter. This negative torque on the smaller wheels is due to the fact that they are pushed forward by their axle or bearings more rapidly than they are rolled ahead by their driving gear.

These figures look rather important, but in practice the matter is less serious. In the first place, the endeavor of manufacturers is to make all tires of the same nominal size alike in dimensions. If the tires on the four driving wheels are unequally worn, the largest and the smallest can be used together on one axle and the two intermediate ones on the other, so that the average diameters of the tires on one axle will be substantially the same. Finally, the effective diameter can be varied by changing the degree of inflation.

In practice, moreover, the loss of power by slippage of one pair of tires on the road, and the consequent tire wear, will be affected by the fact that, owing to road unevennesses, when going at considerable speed the distribution of load between the different wheels varies constantly. There is a certain flexibility in the transmission, including the driveshafts, wheels and tires; these flexible members will absorb the difference in the peripheral speeds of wheels of unequal effective diameters for a short time, and equalization will then take place through slipping at a wheel that is momentarily almost or entirely freed of load.

That there is no undue tire wear on the driving wheels of six-wheelers is borne out by the testimony of C. Owen Silvers, general manager and engineer of the Wolverhampton Corporation Tramways, given in the discussion of Capt. Kuhne's paper before the Institution of Mechanical Engineers (March, 1927). Mr. Silvers said he had had three six-wheelers in operation for nine months, one of them having run 20,000 miles and the three of them together 50,000 miles. All still carried the original pneumatic tires, and those on the vehicle which had run 20,000 miles looked as though they were good for a like distance.

In ordinary driving, and especially at low speeds, since it is almost impossible to get the effective diameters of all wheels exactly alike, one pair of wheels and one axle do practically all the driving. However, the torque load which can be put on one axle is limited by the weight on that axle, unless such devices as chain tracks are used, and each axle therefore need not be designed to be capable of transmitting the whole engine power in low gear. At the same time the propulsive effort which it is possible to exert is not limited by the ground adherence of one pair of wheels, for if the torque applied overcomes the adherence of these wheels they will slip, continuing to exert their maximum propelling effort, and the other set of wheels will then also exert propelling effort.

There is one other angle from which the advisability of using a third differential must be considered, and that is that of spinning of individual wheels when temporarily losing ground contact due to road shock.

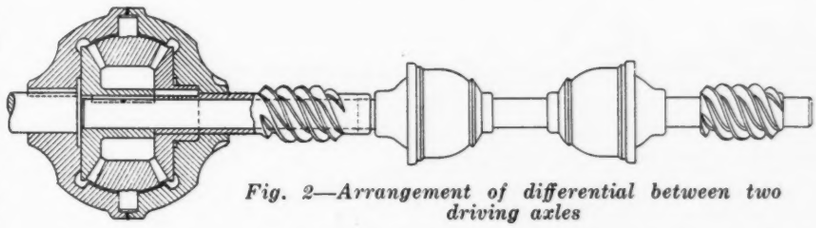


Fig. 2—Arrangement of differential between two driving axles

In a four-wheel vehicle driven by the two rear wheels, if one of the driving wheels loses contact with the ground in consequence of hitting an obstacle, this wheel will be accelerated while the motion of the vehicle and the speed of the other driving wheel will decrease. Then, when the first wheel comes in contact with the road again, it has to be very quickly decelerated, and as a result slipping takes place, with consequent loss and tire wear.

A similar effect takes place when one of the four driving wheels of a six-wheeled vehicle with three differentials leaves the ground; only in this case the acceleration of the freed wheel will be relatively greater, for the three wheels that remain on the ground will slow down and whatever proportional increase in engine speed there may be as a result of the removal of load, will result in a four-fold increase in the speed of revolution of the wheel off the ground. Therefore, when this wheel comes down to the ground again there will be proportionately heavy slippage.

If there is no differential between the two driving axles, then any wheel leaving the ground momentarily will not be accelerated. There will be no interruption in the drive, as the transmission of torque to the two wheels on the other axle will certainly not be reduced and may be increased. Hence the engine will continue to carry practically its normal load and the vehicle will not slow down. As a result, the road wheel opposite the one which lost ground contact will continue to turn at its normal speed and the one which lost contact cannot accelerate. Consequently, wear of tires due to spinning of wheels is eliminated when each axle is positively driven. For this reason the writer would not consider a differential between driving axles desirable in a vehicle that may have to be operated over rough roads a good deal of the time. The owner can do nothing to reduce slippage and wear due to wheel spin, aside from reducing speed, which may be undesirable for other reasons; but he can minimize slippage and wear due to inequality in effective tire diameters by judicious placing of tires and care in their inflation. In the case of the London omnibuses wheel spin is probably negligible, because of the smooth pavements and relatively low speeds.

NEW DEVELOPMENTS—Automotive

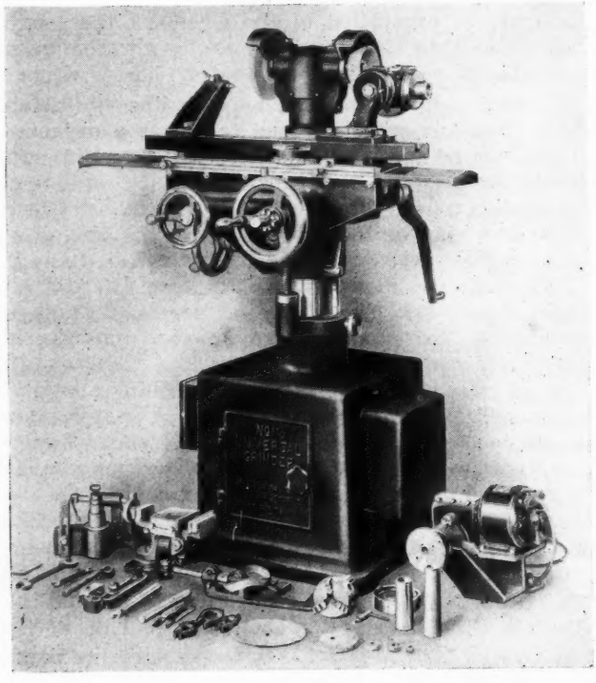
Cutter and Tool Grinder

THE Grand Rapids No. 1½ universal cutter and tool grinder—a product of the Gallmeyer & Livingston Co., Grand Rapids, Mich., was designed to meet the requirements of plants having need for a machine of medium capacity. Convenience of operation received first consideration, and the knee, saddle, sub-table and table were arranged to swing around the column, while the table in turn swivels on the sub-table. Transverse, vertical and longitudinal movements can be operated from both directly in front and from the rear of the machine. Both a hand-wheel and a lever control are provided for the vertical movement.

The vertical and cross-feed movements are obtained each by means of a screw with Acme thread running in a corresponding nut. Both feed screws are provided with dials graduated in thousandths of an inch. The longitudinal movement is provided by a steel rack meshing with a steel pinion with ground shank. This is claimed to ensure free movement without appreciable backlash.

Rigidity has been another aim of the designer, this applying not only to the machine proper but to all attachments as well. The spindle is made of hammered crucible steel, ground to size, and is supported in phosphor bronze bearings with means of adjustment to compensate for both radial and axial wear.

This machine is furnished in either the belt-driven or the motor-driven form. When motor-driven the equipment includes a 1 hp. motor, placed in the base of the machine, for driving the main spindle, and a ¼ hp. motor, built into the headstock, for driving the work. Following are the chief dimensions: Size of table, 5 by 26 in.; longitudinal travel, 16 in.; transverse movement, 8 in.; vertical movement, 6¾ in.; maximum distance of the spindle axis from the table, 9½ in.; maximum swing, 9½ by 20 in.; maximum diameter of face milling cutter that can be used, 12 in.



Grand Rapids No. 1½ universal cutter and tool grinder

Two-Speed Portable Drill

A PORTABLE electric drill fitted with two speeds so that both large and small drills may be used efficiently is the latest product of The Cincinnati Electrical Tool Co. The tool operates at a normal speed of 380 r.p.m. for use with ⅞-in. drills and a shift lever provides a means of changing to a higher speed when smaller size drills are being operated.

Cincinnati two-speed portable drill

This Type UR drill is fitted with a No. 2 Morse Taper Socket in a removable sleeve. It is held in the drill spindle by a large nut. Since the tang of the drill protrudes slightly beyond the end of the sleeve, the use of a drift for removing the drill is unnecessary.

Other features include vanadium steel gears and deep-grooved radial ball bearings; a ball thrust bearing to take up end thrust; adequate lubrication through grease reservoirs, and heavy felt washers secured by metal retaining riggs to keep motor windings clean and dry.

The tool is furnished with a universal motor for 32, 110 or 220 volts. The Cincinnati fully inclosed switch with cable clamp is furnished.

Ohmeter and Circuit Tester

ROLLER SMITH CO., New York, has developed two new instruments, Type COM Ohmeter and Type HTD Circuit Tester. The Ohmeter was developed to meet the demand for a small, compact and rugged resistance measuring instrument for measurements from 0.5 ohms to 50,000 ohms. It is direct reading and is operated by an easily-replaced, self-contained dry cell.

The new circuit tester was developed to provide a small and reliable device for circuit testing and approximate resistance measurements.

Eastman Door Check

THE Concealed Door Check Co., Inc., Kokomo, Ind., announces a new Eastman concealed door check of the top-rail type incorporating a number of advanced features, foremost being the elimination of rattles. It is also stronger than previous types. The new check is known as the Eastman No. 11. Its production will not interfere with the Eastman No. 7, a rubber type

Parts, Accessories and Production Tools

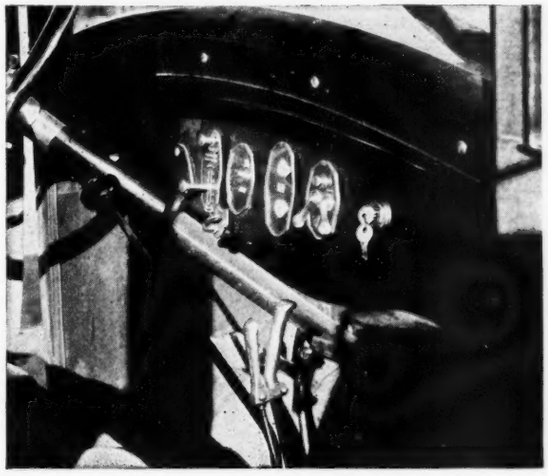
check which the concern has been manufacturing. It is explained that the new model has been developed to meet requirements that are entirely different.

Acts Also as Anti-Rattler

The Eastman No. 11 check is composed of two steel slotted sliding members, a portion of which is covered by a light metal housing which contains a compression spring. When the door swings open this spring acts as a buffer. When the door is fully closed the spring acts as an anti-rattler, all parts being under spring tension. Installation calls for only a shallow cut-out of small area. The conventional long, deep leader channel is not necessary. Only four attaching screws are used in placing the check in position, and because of the low first cost and the ease of installation, the device is said to be notably economical.

Shaler Co. Marketing Lock

THE Shaler Co., of Waupun and Milwaukee, Wis., is now marketing the coincidental lock which was developed by the Bauer Lock Co., of Chicago, the Shaler company having taken over the latter concern some time ago. The lock may be mounted anywhere on the instrument board within easy reach of the driver, as shown by the accompanying illustration. Shutting off of the engine locks the car and it is impossible for the driver to leave the car unlocked. It is said that the design is such as to permit easy and low-cost installation in production.

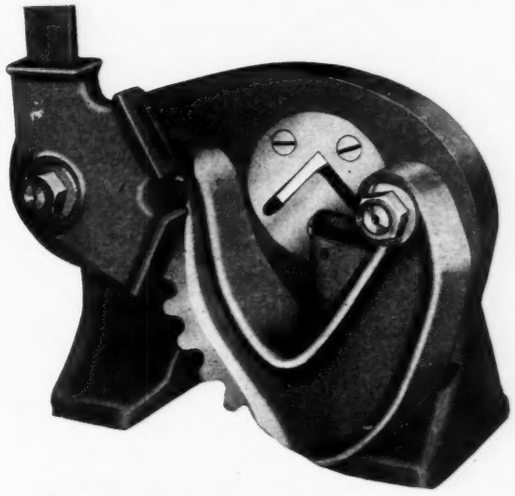


Bauer coincidental lock mounted on dashboard

To unlock, the key is inserted in the lock and turned 90 deg. to the right, in which position the switch is closed. To stop the engine and lock the car the key is turned 90 deg. to the left and removed. It is essentially a compound lock which is claimed to give all the protection that any manually-operated lock would give when in the normal position, and having an electrical auxiliary or automatic device which acts as a secondary safety device when a thief attempts to cut through and trace the circuit or work around the device to establish the circuit.

Angle Iron Shear

A NEW angle iron shear with a capacity of 3 by 3 by ¼-in. angle iron or lighter has been placed on the market by the Whitney Metal Tool Co., Rockford, Ill. The new shear has an eccentric gear so that the leverage is equally distributed over the entire cutting blades and there is also an adjusting screw provided so that all angles can be cut off square. A self-clamping pad is employed to hold the work in position and a flat bar handle, milled to fit the socket so as to prevent lost motion, is furnished with each shear.



Whitney Metal Tool angle iron shear

Power Rapid Traverse Shapers

THE Cincinnati Shaper Co. has announced that power rapid traverse is now standard on all its shapers. By means of a small curved lever at about the center of the machine the table can be shifted quickly into position for the next job. Direction of the movement is controlled by the feed engagement lever.

Power rapid traverse is applied as an integral part of Cincinnati shapers. The quick traverse operates directly from the drive pulley and can be operated at any time, whether the ram is working or not. It is driven through the regular feed friction shaft. The new mechanism involves no added oiling difficulties, it being included in the automatic oiling system for the shaper.

A ratchet crank is provided for hand-feeding when desired. Other changes made on the standard shapers include increased length of ram bearings, reduced overhang in front of ram bearings and a guard added to protect the ram bearing from dust and dirt.

THE Cutler-Hammer Mfg. Co., Chicago, has just developed a small across-the-line starter for 5 hp. a-c. motors, which provides push button control, thermal overload protection and no voltage protection. The contactor consists of a roller which is forced between two fingers thus giving a double break and securing a wiping contact.

French *Talbot* Company Building New 122 Cu. In. *Six*

Designed to meet European demand for greater flexibility. Two-piece pistons used. Completely machined crankshaft. Shackles at forward end of front springs.

By W. F. Bradley

THE French Talbot Co. will present at the next Paris show and will specialize next season on a 122 cu. in. six-cylinder model having a wheelbase of 127 in., weighing 3300 lb. with Weymann fabric sedan body, capable of 65 m.p.h. and having a wide range of speed on high.

Undoubtedly this model will eventually replace the firm's present four-cylinder job. It has been produced to meet the growing public demand, created by American competition, for a greater degree of flexibility. It is maintained that it has more rapid acceleration on high (except from very low speeds) than competitive American cars, that it allows of a higher average on French roads and that it is superior in brakes, steering and general balance.

Changes in design compared with previous models built by this firm are the adoption of generator ignition, the use of a single-unit electric generator and starter, semi-elliptic instead of cantilever springs at the rear, and front springs with the shackles at the forward end.

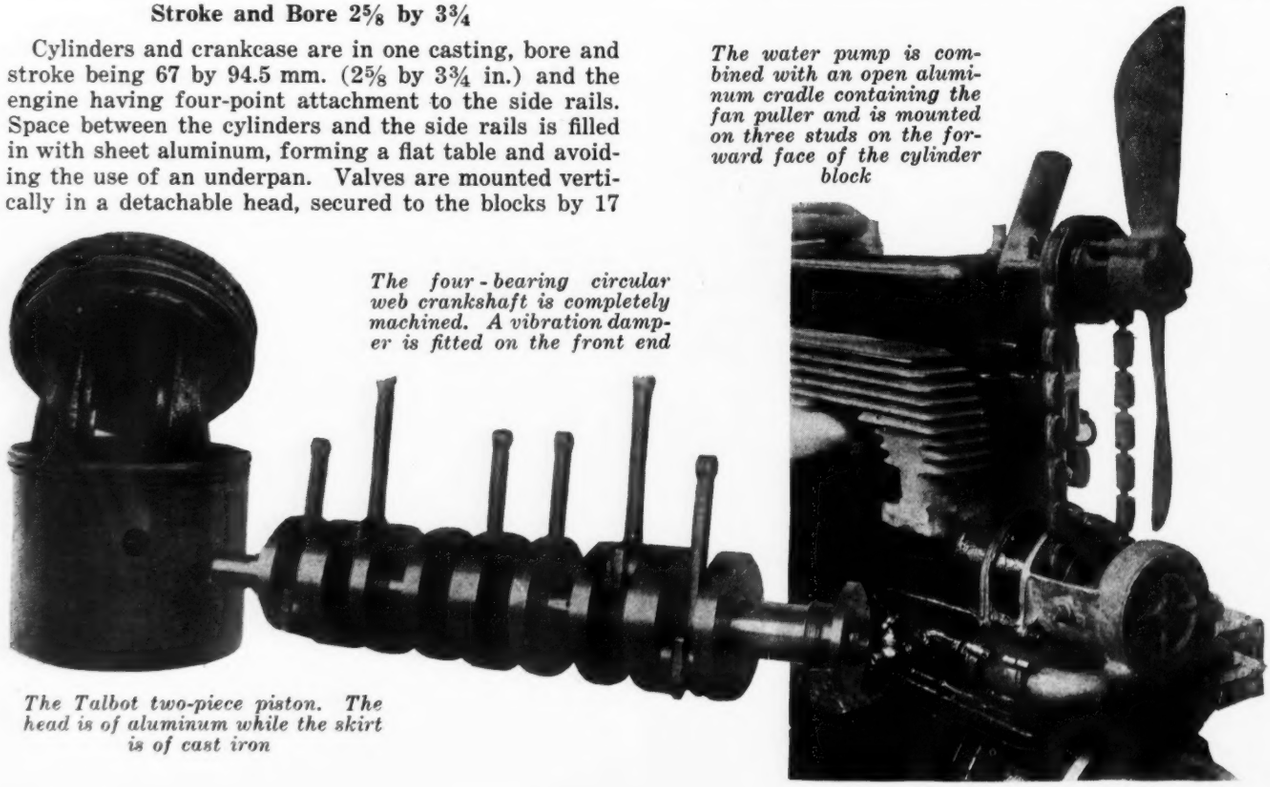
Stroke and Bore 2⅝ by 3¾

Cylinders and crankcase are in one casting, bore and stroke being 67 by 94.5 mm. (2⅝ by 3¾ in.) and the engine having four-point attachment to the side rails. Space between the cylinders and the side rails is filled in with sheet aluminum, forming a flat table and avoiding the use of an underpan. Valves are mounted vertically in a detachable head, secured to the blocks by 17 studs. Operation of the valves is by push rods and rockers from a camshaft within an oil-retaining chamber inside the crankcase. Formerly chain drive was used for the camshaft, but this has been replaced by helical gears, the camshaft pinion being cut in Celoron.

The completely machined circular web crankshaft has a diameter of 55 mm. and is carried in four white-metalled bearings, the length of the intermediate bearings being 50 mm. A vibration damper is fitted on the front end of the crankshaft, within the base-chamber. The engine develops 45 hp. at 3400 r.p.m., but will run up to 4000 r.p.m. without trace of vibration either when accelerating or decelerating.

Connecting rods are I-section, with two bolt caps. They can be withdrawn, together with the pistons, from below, after the aluminum oil pan has been removed. Use is now made of a two-piece piston, the head being of aluminum alloy and the skirt of cast iron. From the head there are extensions for the piston pin bosses; the skirt overlaps the bottom portion of the head for a few millimetres and the hollow piston pin

The water pump is combined with an open aluminum cradle containing the fan puller and is mounted on three studs on the forward face of the cylinder block



The four-bearing circular web crankshaft is completely machined. A vibration damper is fitted on the front end

The Talbot two-piece piston. The head is of aluminum while the skirt is of cast iron

floats in both the piston head bosses and the skirt bosses, the two holes, of course, being reamed out together. Three compression rings are fitted in the head, and there is a Perfect Circle scraper ring on the top of the skirt, with return oil holes behind it, and a chamfered edge below it, also with return oil holes.

These two-piece pistons weigh very little more than aluminum alloy pistons; they can be set up to close limits when the engine is new without danger of seizing, and they appreciably reduce oil consumption.

Lubrication is under high pressure to main and connecting rod bearings and to the overhead valve gear. A feature is the grouping of the oil instruments on the left-hand crankcase web. These comprise a gauze filter which can be removed by unscrewing one nut, a dipper stick, and a lever opening the drain cock. The basechamber is filled through the overhead valve gear cover and there are two breathers, one at each end of the crankcase.

The 12-volt Paris-Rhone single unit generator and starter is driven off the nose of the crankshaft and passes through a hole cut in the forward cross frame member. As the flange on the starter prevents this latter being drawn out completely from the front, the cross frame member is bolted to, instead of being riveted to the side rails. A Delco distributor, turning clockwise and driven by skew gearing off the center of the camshaft, is employed. Plugs are inclined in the head. The water pump is combined with an open aluminum cradle containing the fan pulley and is mounted on three studs on the forward face of the cylinder block. It is driven through an intermediate pinion from the crankshaft. In addition to being quickly demountable, it avoids any possibility of water leaking into the basechamber.

A ribbed exhaust manifold, discharging at the front, has a central projecting heating chamber receiving the gases from the two central cylinders. The aluminum intake manifold is in two parts, with flanges allowing it to be bolted up to the central heating chamber of the exhaust manifold. The mixture is therefore vigorously heated as it emerges from the vertical Solex carburetor.

Forming a unit with the engine, the transmission provides four speeds and reverse. The single-plate clutch is rendered more flexible by being split at intervals on its circumference and both the rear face of the flywheel and the driven member are slightly conical, so that at the beginning of engagement there is a line contact, changing progressively to a full surface contact.

The semi-floating rear axle has spiral bevel gears with a ratio of 5.5 to 1, and receives wheels of 30 by 5.77 in. These latter are the Sankey drop-center all-steel type. The driveshaft has a complete center bearing within the torque tube. The change from cantilever to semi-elliptic springs has been made, it is declared, to get greater comfort at low car speeds. The rear springs are set outside the side rails; they have a width of 2½ in., and the portion ahead of the axle is much longer than the portion to the rear of it. Front springs are also semi-elliptic, with the shackles in front, and the forward portion shorter than the rear part. Perrot brakes are used, in 13.7 in. drums. The Bendix three-shoe system is employed in front. The track is 54 in.

Books for the Business Bookshelf

State Business Laws

Corporations Doing Business in Other States. H. A. Haring. The Ronald Press Co., New York. 302 pp. $5.

CORPORATIONS doing an interstate business often find themselves in difficulties through performing acts which bring them under the jurisdiction of the states in which the acts are performed. In such cases, unless the corporation has complied with the particular requirement of the state for foreign coporations, it may find its contracts unenforceable and its acts illegal. The absence of any standard practice in state laws and in interpretations of these laws by the courts, make this subject an especially difficult one for all companies transacting business outside the state in which they are incorporated. The present volume is a laudable attempt to gather in one place a considerable amount of information concerning what constitutes doing business in a state, what requirements must be met in the various states before such business can be done legally, what the expenses of meeting the requirements are, and other similar matters of value and interest to corporation executives engaged in this type of business.

Sales Management

Developing and Managing Salesmen. Ray Giles. The Ronald Press Co., New York. 216 pp. $2.50.

THIS book is devoted almost entirely to the personal side of sales management in an attempt to show how to build up a good personal relationship between men and management which, the author believes, has quite as much influence upon the success of sales efforts as the very carefully planned campaign material. Contents include such subjects as hiring and firing salesmen, conventions, helping salesmen meet buyers' arguments, how to even out the sales curve and similar items of interest to sales managers.

Advertising, Pro and Con

Economics of Advertising. Roland S. Vaile. The Ronald Press Co., New York. 183 pp. $3.

WITHIN recent years violent partisans of both sides of the question of advertising have waved their cudgels in public. Members and backers of the advertising fraternity have told us that advertising is all good, that it costs nobody anything but, in some mysterious way, pays for itself. On the other hand, we have been told by various others that advertising is all wrong, that it is unnecessary and constitutes a waste of human effort and of material goods.

Wandering in the morass of doubt resulting from an attempt to reconcile these two opposing views the average mortal, with no axe to grind for either side, will be pleased with the present volume which, in a very dispassionate manner, discusses the many faults and favorable features of advertising as it is conducted today. The author finds many things of value in advertising and also many things which are of very uncertain value if not of downright detriment to the community. Altogether, the reader will likely gain a better idea of the whole subject from this book than from any or all of the partisan publications.

Just Among Ourselves

Every City Needs an Airport

INCREASE in the number of cities providing good airport facilities in the near future probably will be an important by-product of the Lindbergh, Chamberlin and Byrd flights which have so strongly fixed public attention on the possibilities of commercial aviation at the moment. Movements for airports have been on foot in a good many cities, but the present wave of aviation enthusiasm may well carry to completion a number of the projects which otherwise might have been held up for a long while. The suggestion of the transportation department of the U. S. Chamber of Commerce that "The selection of an airport site should be definitely linked with city planning" should get particularly careful consideration. A great deal of future difficulty can be avoided by sufficiently accurate foresight exercised at present.

* * *

Railroad Makes Capital of Highway Congestion

THE automobile industry cannot afford to abate for a moment its efforts to get better roads, better traffic control and more efficient movement of vehicles over the highways. Other transportation agencies are not slow to see the disadvantages of highway congestion and to turn them to their own advantage. The Reading Railway system, for example, is running a series of advertisements in Philadelphia newspapers headed by two photographs, one showing the rear end of an automobile on the right with a glaring headlight on the left, the other showing a woman and child riding comfortably in a railway car. Underneath is the question "Which do you prefer—3 hours back of this (the rear end of an automobile) or 60 minutes of this (the comfortable looking Pullman)? The rest of the copy emphasizes the greater comfort and the saving of time from use of the railroad between Philadelphia and Atlantic shore points. The public turned to automobiles because these vehicles provided a more comfortable, easier and more convenient means of transportation than other types of carrier; it will continue automobile use in those instances where these advantages continue to prevail.

* * *

Going a Long Way to Insure Accuracy

WE were interested the other day to add to our file of useless statistics the information that a check sheet made up for a sanctioned A.A.A. stock car speed test run last week was 250 feet long and 11 inches wide. Placed end to end it is easy to see that several of these would reach quite a long way. Speaking seriously, however, the figure does help to visualize the detailed care and accuracy with which such tests are supervised and checked. It is this very thoroughness which gives results obtained under A.A.A. sanction so much authority in the eyes of the industry and the public as a whole.

* * *

Car Roofs May Soon Be Made of Sawdust

HAVE we neglected the roof?" asks a recent bulletin of the Automobile Body Builders Association, pointing out that "Certainly the cooler we keep a man in hot weather, and the warmer in cold weather, the more he is going to use those motor car miles, which is what we are selling." The bulletin continues: "We have had chicken wire roofs and webbing roofs and pressed metal roofs, and it may be that the next step will be to roofs of molded sawdust held together with a binder and suitably reinforced. In the automobile industry nothing is altogether improbable." Then attention is called to experiments about sunshine on roofs and what it does to temperatures in buildings made by F. C. Houghton of the research laboratory of the American Society of Heating and Ventilating Engineers. It becomes more apparent that the original ideas for improvements in automobile design may come, in many instances from fields superficially thought of as quite foreign.

* * *

"First 100 Years Are the Hardest"

SOME old Lancaster, Ohio, school records for 1828 were unearthed recently which show that permission was asked to hold a debate in the school as to whether railroads were practical or not. Turning down the request, the board said: "You are welcome to use the school room to debate all proper questions in, but such things as railroads and telegraphs are impossibilities and rank infidelity. There is nothing in the Word of God about them. If God had designed that His intelligent creatures should travel at the frightful speed of 15 miles per hour by steam, He would have foretold it through His holy prophets. It is a device of Satan to lead immortal souls down to hell." And 100 years later, the railroad and telegraph, having risen to positions of eminent respectability, there are still some who urge that the automobile has something Satanic in its purposes. The first hundred years are the hardest!—N.G.S.

New Equipment Developed *for* Atomic Hydrogen Welding

Principle of operation same as in design previously announced by General Electric Co., but mechanical and electrical features are improved. Three units in outfit.

AN improved equipment for the application of the atomic hydrogen welding process based on the researches of Dr. Irving Langmuir has been placed on the market by the General Electric Co., Schenectady, N. Y. As may be remembered from the description of the process in *Automotive Industries* of March 18, 1926, a stream of hydrogen is passed through the arc between two electrodes, the hydrogen being converted from the molecular to the atomic state by the intense heat of the arc. A short distance beyond the arc the atoms combine again into molecules, liberating the heat they absorbed within the arc.

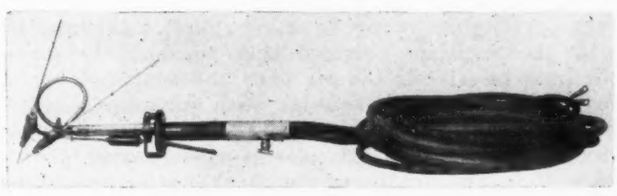
The value of the stream of hydrogen lies in the fact that atomic hydrogen is a powerful reducing agent and prevents the formation of oxides on the surfaces to be united by the welding process. Therefore, alloys containing such highly oxidizable elements as chromium, aluminum, silicon and manganese can be welded without fluxes and without surface oxidation.

The new welding outfit consists of (1) a single-phase transformer for converting the voltage of a 60-cycle source of power to one suitable for the welding equipment; (2) a variable reactor to provide the proper welding current and voltage for different classes of work, and (3) the welding torch by means of which the actual work of welding is performed.

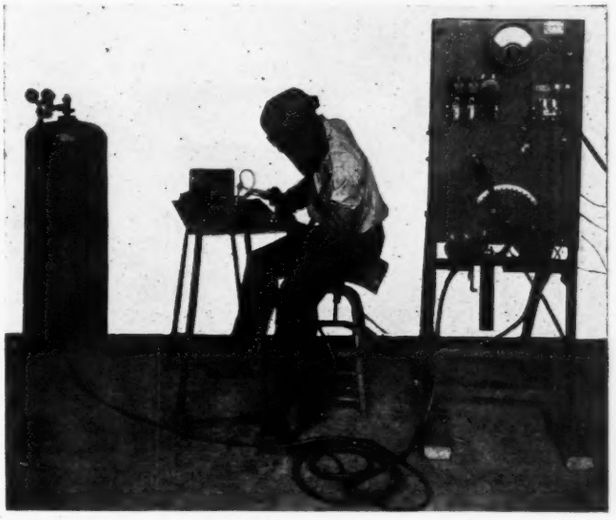
Principle is the Same

While the principle of operation is the same as that involved in the design announced by the General Electric Research Laboratory a year ago, the mechanical and electrical design has been much improved. The torch consists of a holder supporting two tungsten wire electrodes, the electric conductors connecting these electrodes to the reactor and the tubing for the hydrogen gas. Each electrode is supported inside a nozzle through which the hydrogen gas is forced out around the electrode. The combination of electrodes and nozzles is set at an angle and the distance between electrodes, or arc length, and also the flow of gas, are readily adjustable.

The electric conductors to and through the torch are heavily insulated and, when welding ceases, the welding circuit is automatically interrupted until such time as the operator is ready to weld again, when the circuit is automatically restored. In contrast to the usual method of electric arc welding, there is no current flowing from the electrodes to the work to be welded. The circuit is completed from one electrode to the other.



Close-up view of the torch



Atomic hydrogen welding outfit, showing torch control panel and other details

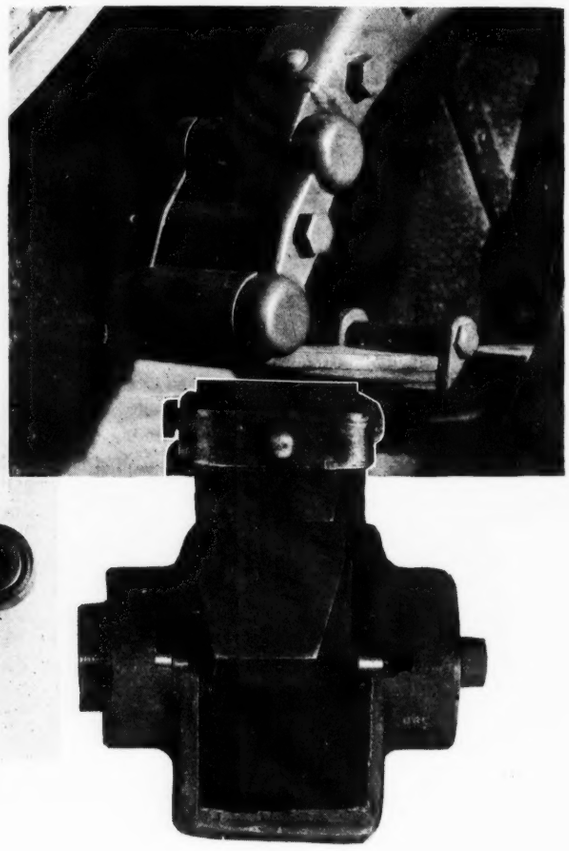
The reactor consists of a U-shaped core provided with pole faces between which a pivoted armature is arranged to move. The legs of the core are provided with coils connected in series with the electrodes of the welding torch. Welding current and voltage are governed by the movable armature which changes the air gap of the magnetic circuit and therefore the reactance. This armature is normally biased to an open position, and, upon a flow of current through the coils of the reactor, is attracted to a closed position that may be determined by means of a handle and a suitable mechanism. When the arc is struck the armature automatically assumes the closed position and remains there until welding ceases, when it automatically resumes the normal position of maximum air gap.

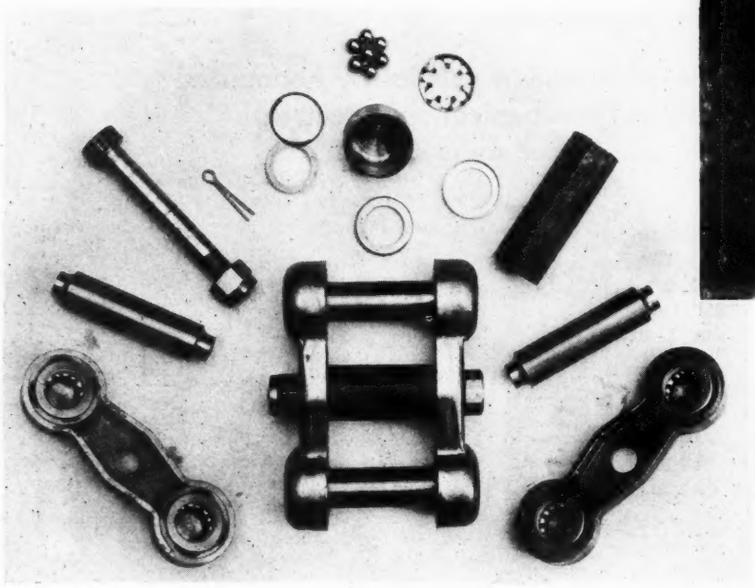
Making Edge Welds

In making edge welds, the metal to be welded is melted under the heat of the arc, but when it is necessary to add more metal, a filler rod must be used and fed into the arc in the same manner as in gas welding.

The new equipment is so far being marketed for operation from 60-cycle, single-phase circuits only, and is recommended for use on ordinary metals of less than ¼-in. thickness, and on hitherto unweldable metals of greater thickness. Metals having a thickness of only 10 mils can easily be welded and the belief is expressed that, in some cases, work as thin as 2 mils (about the thickness of ordinary writing paper) can be welded.

Right—One of the shackles on a test car showing clearance between links and spring and frame eyes to prevent side wear and friction, and (lower right) method of installing ball bearing shackles on spring front ends, showing integrally forged spring hanger bracket





One of the Fafnir ball bearing shackles and component parts

Ball-Bearing Type Spring Shackles Announced by Fafnir

Are designed to eliminate rattles and squeaks and call for lubrication only at 25,000-mile intervals. Require no adjustments. Production cost isn't high.

TO overcome the various disadvantages of conventional spring shackles, a ball-bearing shackle has been developed by the Fafnir Bearing Co., New Britain, Conn., which requires no adjustments, eliminates rattles and squeaks, and calls for lubrication only at long intervals. At the free ends of springs, these shackles are interchangeable with standard types, while at the fixed end a slight redesigning of frame brackets is necessary when adapting the shackles for original installation.

The free end shackle assembly includes two hardened pins of chrome-molybdenum steel, pressed directly into the spring eye and the frame bracket respectively. At their ends, where the pins are of smaller diameter, they carry Fafnir radial-thrust ball bearings held in case-hardened cups, mounted in pressed steel links. Reference to the accompanying detail photograph gives a clearer idea of the general construction. The ball bearing cups are provided with two dust washers, one on each side of a felt oil retainer, the felt being kept against the pin by means of a coiled wire spring around the outside.

The pins are of such length as to prevent contact between the links and bearing cups on the one hand, and the spring and frame bracket on the other, and all thrust as well as radial load is taken by the bearings, preventing wear in other parts. In smaller sizes the bolts are provided with shoulders to space the links relative to the pin ends and bearings, while in the larger sizes a tubular steel spreader is used between the pins, the assembling belt passing through this spreader. This spreader is made rather large, so as to insure rigidity of the shackle after assembly.

Bearing cups are packed with lubricant on initial

installation. Operation of cars equipped with these shackles is said to have shown that, owing to the use of the felt retainers, no additional lubrication is required for periods of 3½ years and upward.

When the shackles were first designed it was thought that all the load might be carried on one or two of the balls. However, running tests with sectioned shackles showed that the bearing has a distinct tendency to rotate in the cup, thus distributing the wear.

In the free end shackle another departure in design is made when the shackle straddles the frame, in which case the central spreader is offset to clear the frame and the links are reinforced at the long ends. When using ball bearing shackles at the front spring ends, a bracket is forged integral with the spring hanger, slotted on both sides in the bottom to permit dropping spring and pin, and with provision for assembling the bearing cups and bearings in this bracket. In assembly, the pin is pressed into the spring eye. Frame and spring eyes are then aligned, and bearings and cups are assembled from the outside, by screwing in the cup, a four-toothed lock washer being used to locate the cup, fastened down with a lock washer and a short bolt or screw, screwing into the bearing cup.

With this design of shackle it is impossible to assemble the units too tight, which might cause squeaks. Rattles are eliminated through the use of anti-friction bearings instead of bushings subject to wear. As stated, experience has shown that the need for service lubrication is eliminated. A further advantage is claimed to be that shackle friction does not vary, hence a permanent adjustment can be made of secondary damping devices such as snubbers and shock absorbers.

The cost of production has been kept down by simplification of the machining operations. The assembly bolts are of standard form, and the remaining parts, such as links and spreader, are cheap to produce, the links being steel pressings, and spreaders short lengths of steel tubing.

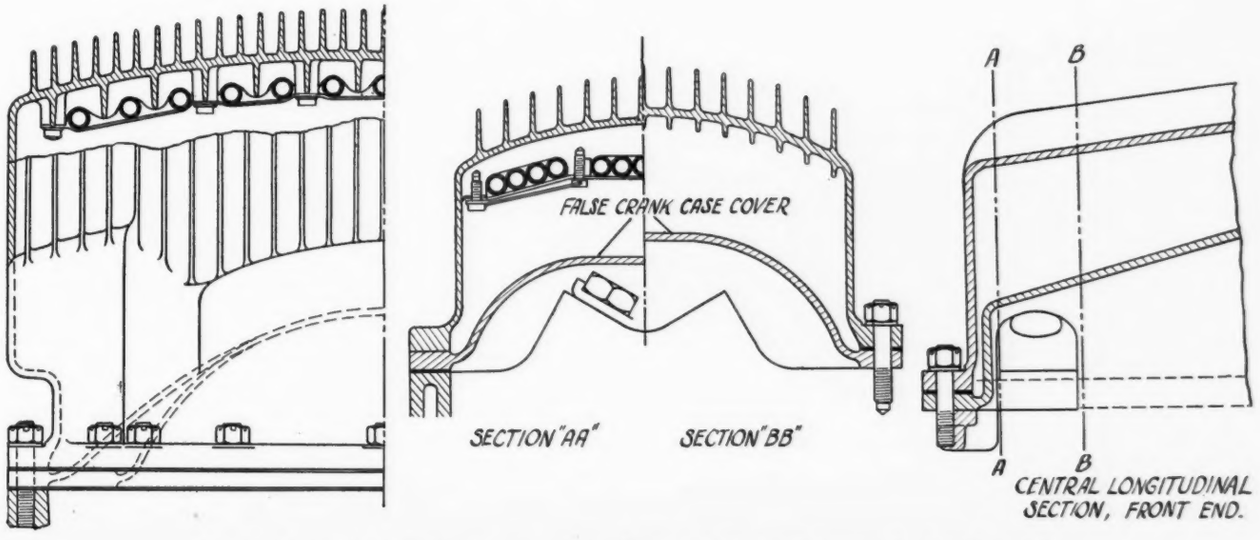
Oil Cooler Built Integral With Aircraft Engine

EVER since the development of the water-cooled airplane engine with dry sump type of lubrication, defects in external oil lines, radiators, and tanks have been prime causes of engine troubles, resulting in forced landings. To eliminate these causes of trouble and thus make the aircraft engine more reliable an interesting self-contained oil cooler and reservoir has been developed by the Packard Motor Car Co.

The new construction has been applied to the Packard 1500 inverted aircraft engine. It consists of a false bottom, or, rather, top, for the crankcase. Above this false top there is an 8½-gal. oil reservoir. Inside this reservoir is a group of sherardized steel tubes longitudinally extending through it, which are fed from a main header at the accessories end of the engine. These tubes have holes drilled through their wall on top. Oil under pressure is forced into these tubes by the oil pump usually used to force oil through the oil radiator. The oil forced through the small holes in the top of the pipes is sprayed against the top of the oil reservoir, which is a finned aluminum alloy casting.

These fins project above the engine and take the place of the cowling formerly used with this type of engine. While the overall height of the engine has been raised slightly through the addition of the false top to the crankcase and the fins, the additional drag is more than offset by the elimination of the oil radiator.

The only external oil lines used are those from the pump to the oil pipe header. An internal standpipe has been included in the new design to take care of the overflow from the oil reservoir, this standpipe draining such oil to the timing gear case, which is capable of holding an additional 2½ gal. A substantial saving in weight has also been achieved in this new design as compared with the previous engine with external oil supply system included.



Detail views of oil cooler on top of crankcase of Packard inverted aircraft engine

Kerosene Engine Will Operate *on* Wide Range *of* Mixtures

Investigation of best fuel/air ratios at Purdue University also shows that maximum economy mixture is always leaner than best power mixture. Tests made on 4-cylinder engine.

RESEARCH work bearing on the motor fuel characteristics of kerosene has been done at the Engineering Experiment Station of Purdue University, Lafayette, Ind., and is dealt with in Bulletin No. 27 of the Experiment Station, "Carburetion of Kerosene," by C. S. Kegerreis, H. A. Huebotter and M. J. Zucrow. The experimental work related particularly to the best fuel/air ratios for different conditions of engine operation and was carried on under three headings, viz:

1. The effect of mixture ratio on engine power and thermal efficiency.
2. The effect of inlet air temperature upon the mixture requirements, the power and the efficiency of the engine.
3. The effect of engine load (torque) upon the mixture requirements.

Two grades of kerosene were used in the tests, of 41.8 and 41.2 deg. Baume respectively. They had initial boiling points of 346 and 350 deg. Fahr., 50 per cent points of 424 and 434 deg. and end points of 524 and 538 deg. The unsaturated content of these kerosenes was determined by absorption in sulphuric acid to be about 7 per cent.

The tests were conducted on a four-cylinder 4⅛ by 5¼ in. Midwest engine fitted with a Stromberg Model M 1¼ in. carburetor and an Eisemann magneto. A shim plate provided by the engine builder made it possible to lower the compression pressure from 80 to 72 lb. gage.

Effects of Temperature Changes

Tests were first run with inlet air temperatures of 150, 250 and 350 deg. Fahr., and the effects of changes in temperature on the brake horsepower and the thermal efficiency were observed over the whole range of practical mixture ratios. The highest power was obtained with the lowest air inlet temperature, but only for comparatively rich mixtures. For mixture strengths not greatly above the theoretical, the highest power was obtained with the intermediate mixture strength, which also yielded the highest absolute thermal efficiency. For each of the three temperatures of operation the mixture strength giving the highest thermal efficiency is only slightly greater than the weakest mixture on which the engine will run with that particular temperature. The results of these air inlet temperature experiments are summarized by the authors of the bulletin as follows:

1. An engine burning kerosene will operate with a wide range of mixtures.
2. For a considerable range the maximum power developed by an engine is insensitive to mixture strength.
3. Thermal efficiency is very sensitive to changes in mixture ratio.
4. The maximum economy mixture is always leaner than the best power mixture.

The inlet air temperature has a strong effect on the leanest mixture that can be burned, and this is important because the maximum efficiency mixtures lie close to the leanest mixtures. The three curves in Fig. 1 show the variation with the air inlet temperature of the leanest mixture with which the engine develops full power, of the mixture giving the maximum brake thermal efficiency, and of the mixture which is so lean as to cause irregular firing of the engine. At 250 deg. Fahr. all three mixture ratios reach stable values which are not materially affected by further heating of the air. Before it was decided to use an inlet air temperature of 250 deg. for the experiments, the effect of the inlet air temperature on detonation was studied. There was detonation over a part of the mixture strength range with each of the inlet temperatures studied, and the width of the range generally increased with the temperature. From considerations of fuel economy, oil, dilution, detonation, etc., the 250 deg. Fahr. air temperature was selected.

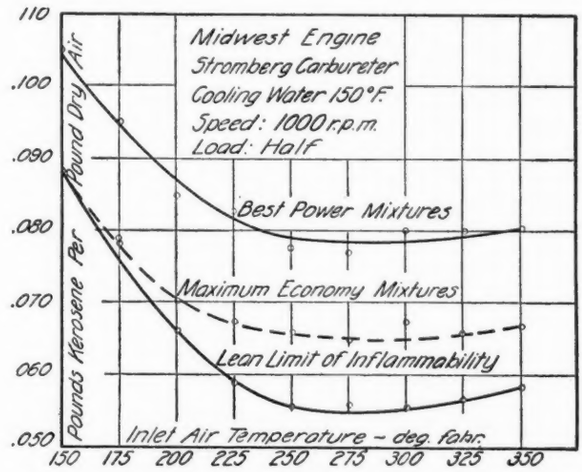


Fig. 1. Effect of inlet air temperatures on the mixture ratios giving maximum power and maximum economy and on the leanest mixture that will ignite

By reducing the compression pressure from 80 to 72 lb. gage and operating with an air inlet temperature of 250 deg. Fahr., detonation was eliminated except at the two highest torque loads. The addition of 15 c.c. of diethyl selenide to a gallon of the kerosene prevented knocking at full load.

In the tests to determine the effect of engine load on mixture requirements the engine was run at 1000 r.p.m. throughout, the inlet air temperature was held at 250 deg. and the load was regulated by interposing various sized throttling orifices between the carburetor and the engine. For each orifice the mixture ratio was varied over the whole range on which the engine could be operated.

Curves representing the variation of the best power mixture, the maximum economy mixture and the leanest firing mixture with the indicated horsepower are shown in Fig. 2. At fractional loads the carburetor should deliver the mixtures indicated by curve *A*. The margin between the mixtures defined by this curve and those defined by the limit of leanness curve *B* is sufficient to assure reliable ignition under all conditions. This maximum economy mixture, however, will produce only about 92 per cent of the maximum horsepower obtainable with a richer mixture. Therefore, if the maximum power is to be developed it becomes necessary to sacrifice economy, and as the throttle approaches the wide open position the mixture should be enriched as suggested by the dashed line connecting curves *A* and *C*.

No tests were made to determine the influence, if any,

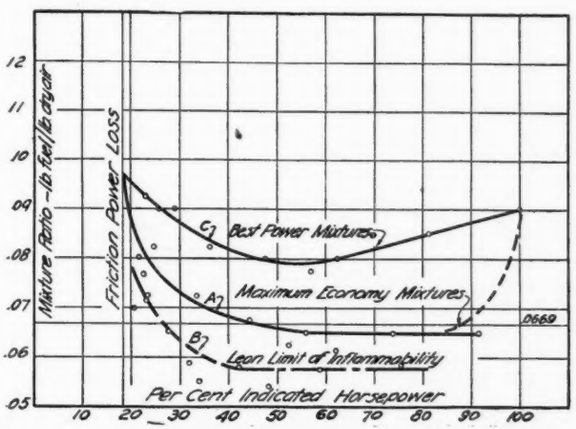


Fig. 2. Effect of indicated load on the mixtures for maximum power and maximum economy and on the leanest mixture that will ignite

of engine speed on the mixture ratio requirements, but curve sheets are reproduced in the bulletin under review from Bulletin No. 11 of the Engineering Experiment Station giving results of such tests with gasoline, from which the conclusions are drawn that at any specific load the mixture ratios giving maximum power and maximum thermal efficiency do not vary with the speed, as long as the latter is not so low as to lead to distribution difficulties, and that at idling loads an enrichment of the mixture is called for at all speeds for both maximum power and maximum thermal efficiency.

The most desirable mixture for idling is evidently the leanest which will ignite without fail even if the metering characteristics should change slightly. Thus the mixture ratio for idling is governed mainly by the range of inflammability at low load, and a mixture of 0.0925 lb. of kerosene to 1 lb. of air is recommended.

As the throttle is opened beyond the idling position it is desirable to supply the engine with a mixture which will enable it to develop its maximum thermal efficiency. As the idling point is passed the mixture should be leaned progressively in accordance with the curve of maximum economy mixtures in Fig. 2. When the load reaches 44 per cent of the indicated horsepower this curve crosses the line of chemically perfect mixture ratio (0.0669). At 55 per cent load the mixture ratio is 0.0650 and from there on it remains constant until the wide-open throttle position is reached.

Since the mixture requirements for any load conditions are not changed by speed, the maximum horsepower curve of Fig. 2 defines the mixtures required for all open-throttle operation. This means that if the engine is throttled so as to operate at 50 per cent of its maximum indicated load, for which the mixture ratio should be 0.0650, and the carburetor is then opened wide to meet an increased resistance, the mixture ratio should simultaneously be automatically increased to 0.0900, that giving maximum torque.

Most Desirable Mixtures

The relation between the most desirable mixture ratio and different conditions of operation may thus be briefly stated as follows:

1. At idling, the engine requires a mixture strength of 0.0925.
2. For economy under level-road or throttled operation the idling mixture should be progressively weakened, and above half load the required mixture is 0.0650.
3. For high power with open-throttle operation the correct mixture is 0.0900.

It should be remembered that the results on which these conclusions are based were obtained with the inlet air at 250 deg. Fahr. (200-220 deg. mixture temperature), with the jacket cooling water at 150 deg. and with good distribution. Changes in these operating conditions naturally would affect the results somewhat, but the conditions were selected as the most favorable to operation on kerosene. Furthermore, most of the results were obtained with a single engine and might be altered somewhat if the same tests were made on different powerplants, but this and the previous research with gasoline indicate that mixture requirements of different engines do not vary greatly.

Germans Demand Standardization

LARGE German commercial vehicle fleet operators have combined with a view to promoting standardization in the design of commercial vehicles, especially with regard to joint dimensions, by bringing pressure to bear on the manufacturing industry. Chief among the members of the new organization, which is only loosely knit and has not been named as yet, are the General Post Office, the Berlin General Omnibus Co., and the various services combined in Motor-Transport Germany, Inc. Many municipal transport establishments, particularly in Southern Germany, also belong to the organization.

What led to the step are the losses resulting from the necessity of keeping in stock a very large number of spare parts. The operators believe that if the joint dimensions or mounting dimensions of parts were stardardized, it would be possible to replace a defective part by a part designed for another, similar vehicle, if necessary. Hence the stock of spare parts could be greatly reduced.

While standardization of automobile parts has been going on in Germany for more than 10 years, the fleet owners feel that not enough has been accomplished from the point of view of unifying mounting or joint dimensions, which is the particular feature that specially interests them.

A joint session of representatives of the new organization with representatives of the manufacturers was held recently.

AUTOMOTIVE NEWS SECTION INDUSTRIES

Philadelphia, Pennsylvania

Saturday, August 13, 1927

Sales and Output Improve in Medium Priced Lines

PHILADELPHIA, Aug. 13—Sales of medium and high-priced cars are on a good seasonal level, but in the lower price brackets buying sentiment is affected by the imminence of the new Ford model. Although the date of this debut is still unknown, most men in the industry expect that when it arrives and the prevailing uncertainty is cleared up the basis for excellent business for all lines will be established.

Reports of high production marks last month and of production further expanded in recent days mostly concern cars above the $1,000 class. Although a part of this output is for the purpose of stocking dealers with new models, the actual sales to the public have been up to expectations and in some lines deliveries are behind orders.

The export market, which has been taking a consistently larger part of the output of American factories, continues good. Figures for the first six months' shipments from the United States overseas, now available, show the gain this year over last to be 26 per cent in passenger cars and 57 per cent in trucks.

More price reductions have been announced, and the prevalence of a downward trend has been definitely established. But as nearly all the leading factors of the industry have announced their new schedules, the unsettlement attending falling prices has been largely eliminated. The reductions were made possible in part by lower prices of equipment and materials but high production is nevertheless needed to maintain adequate profits and more aggressiveness, if possible, is being put into sales policies.

Firestone to Build Pacific Coast Plant

LOS ANGELES, Aug. 10—Russell Firestone, son of Harvey S. Firestone, president of the Firestone Tire & Rubber Co., reported here the purchase of a site near Los Angeles for a $6,000,000 factory for the Firestone company. Construction of the first unit of the factory will begin Oct. 1, and the entire plant is expected to be in full operation by April 1 of next year. The first unit will cover approximately 10 acres of land and will have a production capacity of 5000 tires and 7000 inner tubes a day. When the factory is fully completed it will employ 2000 persons and will have a payroll of about $3,000,000.

A few days before the Firestone announcement, ground was broken in Los Angeles for the erection of the new $4,000,000 Pacific plant of the Goodrich Rubber Co.

Overland Earnings $5,238,053 in Half

TOLEDO, Aug. 11—Net profits of Willys-Overland, Inc., for the first six months this year totaled $5,238,053 after Federal tax reductions, according to John N. Willys, president. Sales during this period totaled 123,665 cars as against 98,000 in the 1926 period. The sales total exceeds any previous six months' business.

Inventories on June 30, 1927, totaled $21,058,235, as against $33,556,118 at the same time last year. Cash on hand totals $15,552,165, as against $9,343,539. Rigid control of inventory and economy in operation have combined with a smooth flow of sales to produce a financial position which is not only a source of strength for current operations, but a sound fortification in the event of any unusual competitive activity, the statement declares.

Dealer field stocks of cars have been reduced almost 25 per cent in the past 60 days. Branch house stocks have been reduced about 50 per cent in the same period. Stocks of used cars in dealers' hands are declared normal.

Ohio Fisher Sale Approved

CLEVELAND, Aug. 9—Absorption of the Fisher Body Ohio Co. by General Motors Corp. was sanctioned by the Common Pleas Court of Cuyahoga County. The fight of three minority stockholders to prevent the absorption will now be carried to the Court of Appeals. General Motors offered the minority stockholders two and one-half shares of General Motors stock for one share of Fisher Body Ohio stock, when the former was listed at $200 per share on the New York exchange.

July Rims Total 1,679,587

CLEVELAND, Aug. 10 — Rims inspected in July totaled 1,679,587, as against 2,123,367 in July, last year, according to the monthly report of the Tire & Rim Association of America, Inc. For the seven months including July the total inspected was 13,101,094, as against 15,318,945 last year.

Storage Batteries Held Not Taxable

PHILADELPHIA, Aug. 10 —Storage batteries are not taxable as an automobile accessory under a decision by Judge O. B. Dickinson in U. S. District Court here. The ruling holds that there is no such thing as an "automobile storage battery" or a "storage battery for automobiles" because storage batteries can be used for a variety of purposes other than in automobiles. Under the ruling the Philadelphia Storage Battery Co. will recover from the government taxes amounting to $326,-074 which it was compelled to pay on batteries sold between 1921 and 1924.

Standards Bureau Shows Results of Fuel Tests

WASHINGTON, Aug. 9 — A "cracked" gasoline serves a purpose in eliminating knocks in automobiles but is no better than a straight distilled gasoline in starting of automobiles, the Bureau of Standards announces this week, following several weeks of tests.

The bureau had been seeking to determine whether or not cracked processed gasoline is superior to distilled gasoline, either for engine starting or operation, as has been claimed by certain gasoline refiners.

Experience indicated that the difference between gasolines of equal volatility was probably too small to be readily detected by engine starting experiments, the bureau states.

"The important factor in engine starting is the time required to build up an explosive mixture in the engine cylinders. Thus the leanest explosive mixture is to a certain extent a criterion of engine starting."

Louth Heads Udylite

DETROIT, Aug. 10—Further details of the purchase of the Udylite Process Co. by Fred J. Fisher and the Union Carbide & Carbon Corp., show that the company will be moved from Kokomo and located at the headquarters of the General Chromium Corp. here. M. E. Louth will be general manager of both enterprises. The directors under the new ownership will be Mr. Fisher, F. M. Becket, Benjamin O'Shea, A. E. Baldwin, I. Levin, M. E. Louth and Earl B. Barnes.

"Within Few Weeks" Ford Statement Says

Tests of New Car Show High Speeds—Proves Better Than Expected

DETROIT, Aug. 11—Introduction of the new Ford car "within the next few weeks" is promised by Edsel Ford, president of the Ford Motor Co., in a formal statement this week. According to the statement, all of the difficulties of engineering and production have now been met and the company is speeding its output preparations.

None of the details of the construction of the new car are shown in the statement, but it discloses some performance characteristics which the tests have revealed. Of these the statement says:

"We have accomplished a speed of 65 m.p.h., which is slightly better than expected.

"We have found that the cars can be driven for hours at an average speed of more than 50 m.p.h. without discomfort to driver and passengers and without harm to engine or other equipment.

"In a recent test one of these new cars was driven 110 miles in two hours. During the first half-hour the car traveled 27 miles. The car covered exactly 56.1 miles the first hour of the trip.

"We have tested this new car for getaway and pickup with many other types of automobiles and have found that it surpasses all of them with one exception in starting and acceleration. The tests already made show that it is faster, smoother, more rugged and more flexible than we had hoped for in the early stages of designing.

"We have known from the beginning that this new Ford would be a handsome car. Experiments have been made with a wide variety of color schemes and body designs, and all these have been decided upon.

"When this car is formally introduced within the next few weeks, we shall be able to say that it is the best and most moderate priced automobile we know how to build."

With regard to preparations for production, the statement says:

"We also know what is needed as to personnel and factory equipment to produce these new Ford cars in greater numbers than any manufacturer has ever attempted before. The work of retooling our plants throughout the country to prepare for the heaviest production schedules we have ever undertaken, is now nearly complete."

Peerless Shows $78,508 Net

CLEVELAND, Aug. 10 — Peerless Motor Car Co. and subsidiaries report for quarter ended June 30, net income of $247,306 after depreciation, Federal taxes, etc., equivalent to 96 cents a share earned on the 258,589 shares of stock. This compares with net loss of $168,798 in the preceding quarter and net income of $694,336, or $2.68 a share earned in the second quarter of 1926. Net income for the first six months of 1927 totaled $78,508 after above charges, equal to 30 cents a share, against $900,138, or $3.48 a share in the first half of the previous year.

Republic Purchases Linn Tractor Plant

ALMA, MICH., Aug. 9—Republic Motor Truck Co., Inc., has purchased the entire capital stock of the Linn Mfg. Corp., Morris, N. Y., tractor manufacturer, and is now the sole owner of that company, including its plant, equipment, goodwill and exclusive selling rights. The operation of the Linn company will be continued at Morris as a division of Republic. The present personnel also will be maintained. Announcement of the purchase was made in Chicago by O. W. Hayes, president of Republic, following a meeting in the offices of M. Rothschild, chairman of the Republic board.

The Linn Mfg. Corp. has been building a special type of tractor since 1916. The Linn tractor is a heavy hauling machine, equipped with either a 75 hp. or 100 hp. engine. It resembles a heavy motor truck except that revolving tracks take the place of rear wheels. The motor and front wheels are identical with those of any heavy duty truck.

General Motors Buys Blossom Lock License

CLEVELAND, Aug. 9—General Motors Corp. have purchased the license to manufacture the Blosson ignition and transmission lock, it was announced by C. W. Blossom, president of the Blossom Lock Co. Patents are held by this company. The license applies to locks for all except Ford cars, Mr. Blossom said.

Sale of the license means removal of the manufacturing operations to the plant of the Delco-Remy Corp. at Anderson, Ind. Engineers are expected to develop a lock for the new Ford cars, if these come out with gear shifts to which the Blossom lock can be applied, and if this is accomplished, Mr. Blossom said, manufacturing will resume here again.

Timken Earnings $660,011

DETROIT, Aug. 10—Timken-Detroit Axle Co. for the six months ended June 30 reported net profits of $660,011, equal to 65 cents a share on 832,073 shares of common, against $1,233,059, or $1.29 a share in the first half of 1926.

Opens Detroit Office

BOSTON, Aug. 10—Anderson Mfg. Co. has opened a Detroit office in the General Motors Building, where G. L. Dernier, sales manager, will have his headquarters. The factory has been moved to 17 Tudor St., Cambridge.

Business in Brief

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co.*

NEW YORK, Aug. 11—Political, financial and agricultural developments of the past week have been of an outstanding nature. A reduction in the rediscount rate from 4 to 3½ per cent by five of the Federal Reserve banks has strengthened the assurance of an abundance of credit for fall trade. The stimulating effect of this ease in money upon business has, however, been somewhat offset by the increased uncertainty over the 1928 presidential election. Release on Monday of the Government's official estimate of the 1927-1928 cotton crop at 13,492,000 bales has caused a precipitous rise in the price of the staple. Retail trade is slightly more active in consequence of the stimulation of sales by "market weeks." Stock prices have made new high records, but in the last few days a part of the advance has been lost.

FREIGHT CAR LOADINGS

For the week ended July 23 railway freight car loadings totaled 1,012,424 cars, marking a slight decrease from 1,016,782 cars loaded in the preceding week. Total loadings for the year to date number 29,216,502 cars, as against 29,126,913 cars in the like period of 1926 and 28,227,955 cars in 1925.

PETROLEUM OUTPUT

A new record was established in the production of crude petroleum for the week ended July 30, with average daily output totaling 2,586,100 bbl., which compares with 2,573,850 bbl. a week earlier and 2,115,850 bbl. for the corresponding week of 1926. In the Seminole field the progress of curtailment measures was reflected in a slightly lower output.

FISHER'S INDEX

Professor Fisher's index of wholesale commodity prices declined last week to 138.7 from 139.5 in the preceding week. The July average for the index stands at 139.4, while the low for the year at 137.9 was registered during the week ended July 24.

BANK DEBITS

As reported to the Federal Reserve Board for the week ended Aug. 3, bank debits to individual accounts increased to a level 12.1 per cent above the total for the preceding week and were 5.9 per cent above that for the like period last year.

FEDERAL RESERVE REPORT

During the same period an increase of $10,800,000 in Federal Reserve notes in circulation, combined with an increase of $63,600,000 in deposits and a loss of $18,500,000 in total reserves produced a fall in the reserve ratio to 77.8 per cent from 79.7 per cent a week earlier. Member banks reported increases of $95,659,000 in loans, $88,986,000 in net demand deposits and $51,234,000 in borrowings from the Federal Reserve banks. Member bank investments declined $43,279,000 during the week.

SOUTH AMERICA'S FIRST CONCRETE ROAD TO BE STARTED DURING PRESENT YEAR

WASHINGTON, Aug. 10—The "missionary work" of the National Automobile Chamber of Commerce and the Highway Educational Board, in good road movements in South America, will bear its first fruit this year, according to a report made to the Department of Commerce by Assistant Trade Commissioner H. A. Bates at Buenos Aires. He reports to the department that the first concrete highway ever built in the South American continent will be started between Moron via Lujan and running into Buenos Aires, and will cost $3,782,500. Latest construction methods will be followed.

"The Lujan road is the initial experiment with tourist roads leading away from Buenos Aires, and its construction, it is thought, will be watched with interest by the groups in Argentina who are endeavoring to promote a widespread good roads movement," the cable says. ■

Traffic Systemizing Still Nearly Zero

WASHINGTON, Aug. 9—Little progress has been made in standardization of traffic regulations and control in the large cities of the country, despite the promotion work that has been done in that respect by manufacturers and automobile owners' organizations, the American Automobile Association finds on a check-up based on questionnaires sent to key cities in every section of the country.

The questionnaire of the national motoring body was designed to shed light on the handling of such matters as right and left-hand turns, one-way streets, parking, automatic control signals, boulevard systems, etc. The results of the check-up show that there are still almost as many theories about these matters as there are cities and traffic "experts."

Cities having almost identically the same physical conditions reject certain plans that other cities adopted as perfect, and vice versa. The need for uniformity is stressed by the organization urging its 800 clubs to agitate the matter.

Crosses to Mark Accidents

BOSTON, Aug. 8—The Boston Automobile Club Safety Committee has arranged to place metal memorial crosses at different points where accidents have been frequent recently to call attention to the need of more careful driving. The crosses are 5 ft. tall and 2 ft. wide. They have caused some comment both favorable and unfavorable since the first ones were put in place.

Edde Company Incorporates

MILWAUKEE, Aug. 10—The Edde Mfg. Co., Milwaukee, has been incorporated with a nominal capital of 500 common shares without par value as the further development of the business conducted under the same name, and manufacturing the "Edde" electro-magnetic oil purifier. E. J. DeGuenther, a well-known Milwaukee engineer and inventor, remains the principal owner. Since the Edde purifier was placed on the market some time ago, sales have increased so that enlargement of plant and production has been necessary several times. It represents fully five years of research, experimental and test work, the latter having established a record of 50,000 miles without changing crankcase lubricant. The device is guaranteed for five years.

Colonial Air Line Drops Multi-Motored Planes

BOSTON, Aug. 8—Gov. John M. Trumbull of Connecticut, chairman of the board of directors of the Colonial Air Transport, Inc., operating airplanes between this city and New York carrying mail and passengers, states that the report originating in this city to the effect that passenger service has been discontinued was not true.

At a meeting of the officials of the company at Hartford yesterday, Gen. J. F. O'Ryan, president, said, he had been misquoted. Ex-Senator James W. Wadsworth of New York, was one of the new directors added to the board at its Hartford meeting. Others were Gen. J. L. Kincaid, of New York, president of the American Hotels Co., and Col. Lawrence La Tourette Driggs, president of the American Club and organizer of the National Guard Flying Service in New York. The company has discontinued the use of multi-motored planes.

Portland Builds Airport

PORTLAND, ME., Aug. 8—The new airport under construction here will be ready for use in less than 60 days, according to a report made by Chairman Phillips M. Payson, to the Chamber of Commerce board of managers yesterday. It will have three runways, a hangar with space for eight machines, lighting equipment, machine shop and office building. It will cost about $60,000 and Portland financiers have subscribed for stock to that amount.

Argonaut Erects Building

TOLEDO, Aug. 6—A new $300,000 building for the Towell-Cadillac Co. will be built here soon by the Argonaut Realty Corp., subsidiary of General Motors. The new structure will house complete sales and service facilities.

N.A.C.C. Joins Plea for Farm Research

Enlarged Program of Study by U. S. Urged by Twelve Organizations

WASHINGTON, Aug. 10—Headed by the National Automobile Chamber of Commerce and 12 other national organizations, a delegation representing farmers, automobile manufacturers, and others this week called on Director of the Budget Herbert M. Lord to urge the inclusion of appropriations during the next fiscal year which will enable the Department of Agriculture to have an enlarged program of agricultural research.

The automobile manufacturer is interested in the farmer from an economic standpoint, Pyke Johnson, Washington representative of the N.A.C.C., told Director Lord, urging that a larger sum should be provided to conduct research in his behalf. He pointed out that only 10 cents per capita is provided in the government's annual budget for research for the farmer, compared with 54 cents for promotion of marine transportation, and $4.65 per capita for national defense.

G.M. of Canada to Build $375,000 Office Building

TORONTO, Aug. 6—The conversion of the present office building of the General Motors of Canada, Limited, at Oshawa, Ont. in the near future into a factory addition has been announced by the Canadian company and arrangements have been made for the erection of a large new office building at Oshawa to cost $375,000. The plans call for a four-story structure of brick and steel construction, the building measuring 48 x 300 ft. It will have two passenger elevators.

A feature of the new building will be that private offices for executives and departments will be provided by sliding steel partitions so that office suites can be rearranged with a minimum of cost, inconvenience and delay.

The building of the new offices is the fourth item undertaken by Canadian General Motors in an expansion program which has already involved an expenditure of $2,000,000 since last October.

Allen-Bradley to Build

MILWAUKEE, Aug. 10—The Allen-Bradley Co., manufacturers of electric control devices widely used in automotive and radio work as well as industry, has announced plans for substantial enlargement of its plant. Architects are completing drawings for a 9-story factory, 50 x 150 ft., adjacent to the present three-story shop, 50 x 100 ft., which will receive five additional floors. Harry L. Bradley is vice-president, treasurer and general manager.

Carolinas Favored by Good Conditions

Large Motor Car Sales Developed by Industrial Activity and Prosperity

CHARLOTTE, N. C., Aug. 8—The advent of new models in several medium priced lines stimulated trade in automobiles in North and South Carolina soon after the beginning of August. The dealers in these two states are facing prospects of excellent business during the fall season.

The only disturbing element of any importance in the retail trade is the uncertainty over the plans of Ford Motor Co., which, reports indicate, is reacting to the disadvantage of Ford dealers. However, other lower priced lines are being bought in liberal measure, the Chevrolet volume continuing to show an increase over the same period last year.

Industry in all lines is busy and the cotton textile industry now is in a stronger position than it has been at any time since 1920. Consequently, the demand for motor cars and motor trucks reflects prosperous conditions. Sales of tires are good, though subject to seasonal influences. The general attitude of car owners to confine themselves to the necessities is reflected in the accessories trade, which is only fair. The demand for supplies and replacement parts of cars and trucks and items of shop equipment is spotty, ranging from fair to good, the slower trade being reported from South Carolina sections.

Washington Sales Increase

SPOKANE, Aug. 9—With the half-rate license fees for Washington effective Aug. 1, there was a strong upward swing during the first week of August in the deliveries of cars, many customers holding off the latter part of July. Total July registrations for Spokane county were 590, of which 328 were new passenger cars, and on Aug. 1, 437 was the total number of registrations filed in the county.

Chevrolet led July registrations, this being the seventh consecutive month this line was in the lead, and Willys-Knight Whippet was second, the third consecutive month. Chevrolet had 74, Willys-Knight Whippet 44, Buick 32, Hudson-Essex 26, Ford 20 and all other makes had registrations varying from 1 to 19 each.

Chrysler, Chevrolet, Willys-Knight Whippet and Buick are among the lines reporting heavy retail and wholesale business the first week of the month.

To Make New Spark Plug

JACKSONVILLE, Aug. 9—The Airkool Spark Plug Corp., organized and incorporated at Jacksonville some months ago, has completed the initial unit of its plant here and is now engaged in the installation of machinery and equipment for the manufacture of spark plugs, production to begin at a comparatively early date, it is announced by Hugh C. Duffy, vice-president and chief engineer of the company. The initial unit represents an investment of about $125,000, including the equipment, and will have an annual capacity of approximately 7,500,000 spark plugs.

Royal Typewriter Uses Plane for Deliveries

HARTFORD, CONN., Aug. 9—Royal Typewriter Co. has instituted a flying truck delivery service using a three-engined all-metal Stout plane built by Ford Motor Co. and delivered in this city this week at a cost of $46,000. There are racks in the fuselage to hold 200 typewriters. A shipping clerk will accompany the plane and parachute the typewriters at designated points.

Relay to Use Garford as Axle and Bus Plant

LIMA, OHIO, Aug. 8—Relay Motors Corp. will manufacture its Relay axle in the plant of the Garford Truck Co., recently taken over, and later will produce a line of buses equipped with this new drive. With the new capacity made possible through the Garford purchase, the Relay company is planning a vigorous expansion of its sales outlets.

A statement by E. W. Bassick said, "We have gone past the experimental stage in the development of the Relay axle drive. Orders have flooded our Wabash factory. Additional facilities were required immediately and we found the Garford plant ideally designed to enable us to promptly expand production."

Gates Starts Power Unit

DENVER, Aug. 10—Gates Rubber Co. has started erection of a $500,000 power plant designed to furnish light, heat and power for its 21 factory units here. The plant is being built under the direction of Carl Ahlquist, chief engineer of the company, and will be ready for operation by Feb. 1, 1928.

Southeast Sees Gain in Last-Half Sales

Atlanta Reserve Bank Reports Leading Lines Showing Steady Upward Trend

ATLANTA, Aug. 9—That sales conditions for the automotive industry in the Southeast during the fall and early winter period give promise of a better than normal business and a substantial gain in volume over the same period in 1926, is seen in the current business review of the Federal Reserve Bank of Atlanta, which shows that all leading lines in the Southeast have been noting a steady upward movement the past few weeks.

Almost without exception wholesalers in the district are more optimistic over the outlook than they have been in several months. They base this confidence on crop conditions in the South this summer and the fact that much higher than usual prices are prevailing for nearly all of the important southeastern crops, principally cotton which is worth today approximately $200,000,000 to $250,000,000 more than earlier in the season.

During the first six months of this year every one of the important wholesale lines showed a loss in volume compared with the first six months of last year in the group of Southeastern States. It is interesting to note, however, that accessories showed the least decline of any other line and that trucks had a slight increase over last year. Motor car business compared favorably with other important lines.

Falcon Offers Speedster

DETROIT, Aug. 7—Falcon Motors, Inc., has introduced a new sport four-passenger speedster known as the Gray Ghost and selling at $1,250. The car is built on the regular Falcon-Knight chassis, a feature being a quick detachable and folding top to protect the occupants of the rumble seat from sun or rain. The top of the front compartment is of the usual folding type and is provided with a waterproof boot.

Labor Department Cites Automotive Wages in Scoring Underpaying in Other Fields

WASHINGTON, Aug. 10—Low wages paid male common laborers in some industries are scored in a report just made public by the Department of Labor, declaring that millions of workers are woefully underpaid in many industries ..... insufficient for support of their families.

For the purposes of comparisons the wages paid to common laborers in the motor vehicle industry are cited. The figures show that that industry is second on the list of industries which paid good wages to its common laborers. The average weekly wage last year was $28.73, being outranked only by laborers in the anthracite coal mines who earned $29.42.

The department found that last year the average full time hours per week worked were 50.4 in the automobile industry; that the lowest labor wage was $24.02 per week and the highest $30.26, or a general average of $28.73 for the industry.

The lowest wage was for track laborers earning $17 per week on an average, and laborers in the lumber industry earning $17.77 per week for a 57.5 hour work.

Men of the Industry and What They Are Doing

Bauer Optimistic After South American Survey

George F. Bauer, secretary of the foreign trade committee of the National Automobile Chamber of Commerce, returned from a South American trip this week vastly encouraged by the rapid expansion of road building in virtually all countries south of the Panama Canal.

What is mostly needed, he said, is a more general appreciation that roads could best be financed by bonds which would be paid off by the accumulation of motor taxes rather than waiting for taxes to build up sums sufficient for the purpose.

In addition, Mr. Bauer saw the need for better financing for American car dealers in the South American countries. The capital needs of these dealers are extraordinarily high and most of them have to do their own financing. The failure of most of the countries to pass laws protecting conditional sales agreements places a heavy burden on the dealers.

The plan for a Pan-American highway, linking the two continents, will be brought much closer to realization, Mr. Bauer reported, when the American government builds six miles of highway in the Canal Zone to link up with the Panama government roads and constructs a bridge over or a tunnel under the Panama Canal.

Hoffman to Address N. A. D. A.

Paul G. Hoffman, vice-president in charge of sales of the Studebaker Corp. of America, will speak at the business session of the third annual convention of the Ohio Council National Automobile Dealers Association at Cleveland, Sept. 14. Mr. Hoffman will speak at the opening session of the convention on the subject of "Management."

Morris Back From Coast

W. J. Morris, vice-president of American Chain Co., Inc., has returned to his offices at Bridgeport, Conn., following an extended trip to the Pacific Coast, on which he attended the Automotive Equipment Association convention and visited distributors in leading cities.

Durant to Go Abroad

William C. Durant will sail for Europe on Aug. 20 on an extended vacation. The trip was planned several months ago but was deferred because of Mr. Durant's plans for an expansion of his automotive interests.

Flynn Joins Oakland

C. J. Flynn, formerly production engineer in the railway and jack division of the Buda Co., has joined Oakland Motor Car Co. and will be engaged in manufacturing research.

Harley Earl Forms New G.M.C. Division

Harley Earl, formerly body designer and consultant of Cadillac Motor Car Co., is organizing a division on designing arts and color to act in an advisory capacity for all automobile divisions of General Motors Corp. A special Cadillac sport phaeton, designed by Mr. Earl, was awarded first prize at an international automobile contest for efficiency and beauty of appearance recently held in Berlin, Germany, with the second prize going to LaSalle.

Ball Heads A. I. E. E. Section

John D. Ball, vice-president of the School of Engineering of Milwaukee, and prominent in the automotive electrical field, has been elected president of the Milwaukee Section, American Institute of Electrical Engineers. New directors include John U. Heuser, Cutler-Hammer Mfg. Co.; Edward N. Jacobi, Briggs & Stratton Co.; Lewis F. Reinhard, Geuder, Paeschke & Frey Co.; Henry V. Nye, Allis-Chalmers Mfg. Co., and H. L. Van Valkenburg, Industrial Controller Co.

Dreves Joins Oakland

Louis M. Dreves, widely known in the Pacific Coast automobile trade, is now associated with Oakland Motor Car Co. as special sales representative in the Pacific Coast and Rocky Mountain territories. Mr. Dreves joins Oakland after eight years' service with Chevrolet Motor Co., which included a branch managership in Chicago, a year in San Francisco as special representative, and five years as zone manager at Los Angeles.

Olson Goes to Detroit

Charles G. Olson, formerly of the main office of the Chain Belt Co., Milwaukee, has been transferred to the Detroit office. Mr. Olson was connected with the sales department for several years before his transfer. He will look after the Rex chain and engineering business of the company in Detroit territory with headquarters at 8855 Woodward Ave.

Dunlop Service Manager

Alex Dunlop, who worked with Henry Leland 27 years ago on motor boats in Detroit and was with Mr. Leland when the latter first brought out the Lincoln car, has taken charge of the Lincoln service department of Universal Auto Co., Spokane, Wash.

Strickland is Appointed Bower General Manager

S. A. Strickland has joined Bower Roller Bearing Co., Detroit, as general manager, his appointment being accompanied by that of Dr. Hilton G. Freeland, as manager of the metallurgical department. Mr. Strickland previously was connected with the Hoover Steel Ball Co. and with the Imperial Ball Bearing Co. Dr. Freeland also was connected with the Hoover company and with the University of Michigan.

The Bower company is contemplating an expansion of its activities in the bearing field. Continuing the manufacture of its own type of bearings, it also is planning to manufacture taper and roller thrust bearings to cover the entire roller bearing field. New equipment is being installed and the company expects to be in early production on its new bearing types.

White Back from Abroad

Windsor T. White, chairman of the board of the White Motor Co., is back in Cleveland after attending the economic congress of the International Chamber of Commerce in Stockholm, Sweden, and visiting France, Germany, Belgium, England, Holland and Norway. "International understanding is greatly on the increase," he said. American highway transportation, Mr. White said, is many steps ahead of the European. Smaller trucks and cars on the continent are largely American.

Page Entertains G.M. Officials

President Alfred P. Sloan, Jr., and six members of the executive committee of the General Motors Corp. visited the New Departure Mfg. Co. plant at Meriden. In the party besides Mr. Sloan were Donaldson Brown, John L. Pratt, John J. Raskob, Fred J. Fisher, Charles T. Fisher, and Lawrence P. Fisher. W. A. Fisher and Edward R. Stettinus were also in the party. They were met by President DeWitt Page of New Departure, Division Manager Charles M. Gearing and Vice-President Frederick G. Hughes.

Attend Dealer Conference

R. T. Romine, general sales manager of Hudson Motor Car Co., and W. A. James, advertising manager, spent Aug. 2-3 in Milwaukee as guests at a state-wide conference of Hudson-Essex dealers at the headquarters of the Jesse A. Smith Auto Co.

Kohl Joins Automotive Tool

Fred W. Kohl has joined the Automotive Tool Mfg. Co., Milwaukee, as vice-president in charge of sales. Mr. Kohl is widely known in the automotive wholesale field.

Air Transport Lines Form Association

H. M. Hanshue President of Organization Comprising All Licensed Companies

CHICAGO, Aug. 5—The American Air Transport Association was organized here this week by leading air transport companies, the membership as announced including every licensed air transportation company in the United States. The purpose of the association is to provide mutual aid for members in dealing with the government and the public.

Harris M. Hanshue, president of the Western Air Express, was elected president; T. Clifford Ball, Pittsburgh, vice-president, and W. G. Herron, San Francisco, secretary and treasurer. The directors are Col. Paul Henderson, Chicago; G. S. Childs, Philadelphia; W. B. Robertson, St. Louis; George Tidmarsh, Washington, D. C., W. T. Varney, San Francisco, and J. F. O'Ryan, New York.

Headquarters of the association will be established in Chicago, with the first annual meeting next November.

Companies represented at the organization meeting were:

Pitcairn Aviation, Inc., T. Clifford Ball Co., Robertson Aircraft Co., Western Air Express, Colonial Airways, Boeing Air Transport, Inc., Pacific Air Transport, Varney Lines, National Air Transport Co., Ford Air Service, and Stout Air Service.

German Aircraft Makers Plan World Show in 1928

BERLIN, Aug. 1 (*by mail*)—Negotiations of German Aircraft Builders and the exhibition office of the council of the City of Berlin have just been completed and it has been decided to hold an international aircraft show at Berlin the coming year from March 23 to April 11. The show is to propagate the idea of the purely commercial and sporting aircraft against military planes.

It is meant to give a complete survey of aeroplanes for transport of goods and persons, for machines of the sporting type and school planes of all nations, as well as of all existent engines, accessories, measuring instruments, raw and semi-raw materials used in the construction of aircraft.

To Hold Airplane Show

NEW YORK, Aug. 8—An airplane exposition will be held here in the fall in the 258th Field Artillery Armory at Kingsbridge Road and Jerome Ave., Bronx, it is announced by Major General John F. O'Ryan, chairman of the American Aeronautical Exposition.

Adopts Slotted Wings

LONDON, July 27 (*by mail*)—At the annual meeting of Handley Page, Ltd., owners of the patents relating to slotted wings for airplanes, F. Handley Page, managing director, said that after exhaustive tests by the Royal Air Force the British government has decided to adopt and fit the slot and aileron control to the Bristol Fighter machines, a type which is now one of the most widely used by the R. A. F. He also referred to the fact that a license for use of the American patent has been acquired by the U. S. government.

Europe Air Travel Far Ahead of U.S.

WASHINGTON, Aug. 11—Aviation progress in Europe, with the exception of engine construction, far surpasses that in the United States, the Department of Commerce announces following a comparative survey of the two countries. The results show that the average passenger rate per mile in the United States is $0.12 compared with $0.08 in Europe.

Some other comparative figures of the two continents:

Miles of airways, U. S., 8525; Europe, 31,137.

Airplane miles flown on airways, U. S., 4,428,772; Europe, 8,853,552.

Number of routes operated, U. S., 16; Europe, 100.

Passengers carried, U. S., 5782; Europe, 102,178.

Freight carried, U. S., 1,733,090 lb.; Europe, 9,880,115 lb.

Mail carried, U. S., 810,855 lb.; Europe, 2,853,550 lb.

License Arrangements Made for A. C. Patents

NEWARK, N. J., Aug. 8—The alternating current patents owned by the Electric Arc Cutting & Welding Co., known as the Holelag patents, and the inductor reactor alternating current patents known as the Arendt patents, owned by Owen Electric Mfg. Co., have been consolidated into one license arrangement. Fixed terms for license under the patents have been set and many companies making alternating current machines are reported making applications. The consolidation covers the rights to the use of alternating current for arc welding.

Chandler Shipments Gain

CLEVELAND, Aug. 8—July production of Chandler-Cleveland Motors Corp. totaled about 2000 units against 1200 in July, 1926, and compared with shipments of 1500 in June, and 3366 in May. Production for the first half was 15,803 against 11,800 for the corresponding period last year.

Fiat Cuts Output to 100 Daily

WASHINGTON, Aug. 10—The Fiat Automobile Co., one of the leaders of the Italian market, having a daily capacity of about 700 cars, has curtailed production to 100 per day, the Department of Commerce is advised. Despite the curtailment in production the company's export business is well maintained, the cable states.

Standard Oil Gets German Fuel Patent

Working Agreement Reached for Rights and Operation in United States

NEW YORK, Aug. 8—According to a dispatch from Frankfort-on-Main, Germany, as a result of negotiations carried on at Mannheim and Heidelberg, between Managing Director Bosch and other officials of the I. G. Farbenindustrie A.G. (the dye trust), and Walter C. Teagle, president of the Standard Oil Co. of New Jersey, a working agreement has been reached with regard to both patents and operation in the United States of the two organizations, and for combining the results of technical experiments on both sides of the Atlantic in the raw oil business.

Avenues for cooperation in other fields of common business interests also were discussed during the negotiations.

The development work under way by the dye trust that undoubtedly interests the Standard Oil Co. most is the synthetic production of gasoline from coal by the Bergius process, as described last fall in a paper presented by Dr. Bergius before the Coal Congress at Carnegie Institute of Technology.

See Boom in German Market

NEW YORK, Aug. 9—Engine fuels and crude oil obtained from coal by the Bergius process will be placed on the German market before the end of this year, according to word received here. This development follows the announcement of an agreement between the Standard Oil Co. of New Jersey and the German Dye Trust.

It is expected that plants in Germany will produce synthetic gasoline sufficient to meet 20 per cent of the nation's gasoline consumption in 1928, and that within a few years all imports of oil will be obviated. The synthetic fuel will sell at a considerably lower price than imported fuels and is expected to result in a largely increased usage of and demand for motor vehicles.

Attwood Buys Loxrite

GRAND RAPIDS, Aug. 10—Attwood Brass Works have announced their purchase of all manufacturing rights to Loxrite radiator caps formerly controlled by the Loxrite Corp. and Wolverine Metal Specialties Co. The production and sale of the product will be increased, B. H. Cook, sales manager, said.

361,602 Cars in Australia

WASHINGTON, Aug. 10—Automobile registration in Australia has increased 304 per cent during the past five years, the automotive division of the Department of Commerce is informed. On Jan. 1, 1922, the Australian registration was 89,191 motor vehicles, compared with 361,602 on Jan. 1, 1927.

Mechanical Device Measures Gasoline

Elimination of Attendants in Remote Districts Seen as Likely Development

OTTAWA, ONT., Aug. 6—A mechanical device that may revolutionize the gasoline service station business, particularly in remote sections and during the night hours, has been invented by S. J. Polock and J. K. Richardson of St. Mary's Ont., and it has been favorably passed upon by Canadian Government inspectors.

The mechanism, which has been evolved after years of effort, consists of a gasoline slot machine. The invention enables motorists to buy gasoline by placing a coin in the slot and, automatically, the gasoline is pumped into the tank of the car or into any desired receptacle. The new vending machine is similar in design and appearance to the present service pumps, but it is on a self-serving plan. There is no need for the personal attendance of a station salesman. This means that a gasoline pump can be used by a motorist late at night or it can be installed far from any habitation.

The machine is constructed so that it will serve 25 cents' worth of gasoline at current prices and the purchaser can see the amount that he is getting for that sum. It does not sell gasoline by the gallon because this would require odd cash amounts. The machine can be set, however, so that different quantities of gasoline can be served for the 25 cents, according to gallon market quotations. A purchaser can repeat the operation until the tank of his car is filled. The machine cannot be operated when the pump is empty.

The first of the automatic gasoline pumps has been built at Hamilton, Ont.

Clutch Patent Awarded

WASHINGTON, Aug. 6—Patent No. 1,635,873 has been granted to Lionel M. Woolson, for an improvement in motor vehicle clutches, the U. S. Patent Office announces. The claim was allowed after Woolson had noted an appeal from a former decision denying him the patent, which was applied for in May, 1922.

The nature of the invention is described as comprising a piston operable by the engine vacuum or suction and connected to the clutch lever in such a way as to oppose the clutch spring and reduce the pressure which it exerts to hold the clutch plates in engagement. The suction connection to the engine is controlled by a valve which is operated by a solenoid, and the solenoid circuit is controlled by a switch movable with the engine throttle so that the device is only operated when the throttle is closed or nearly closed, thus permitting the use of high gear at low speed operations.

Says British Maker to Build in Canada

OTTAWA, Aug. 6—Theo Feilden of London, England, director-general of the Empire Trade League and editor-in-chief of the Empire Mail, London, announced during a visit in Ottawa, the Canadian Capital, that a large automobile manufacturing company of Great Britain had undertaken to establish a factory and warehouse in Canada for Canadian production. The Canadian prices of this British car would be surprisingly low, he declared. The identity of the company would be announced when Canadian plans are completed in the near future, he stated.

General Airways Acquires Two Plants in Canestota

NEW YORK, Aug. 6—General Airways Corp. has purchased two plants in Canestota, N. Y., for the production of planes and engines. One of the plants formerly was occupied by Sherwood Brothers and the other by Marvin Casler Co. The Hartney airplane, which is designed to meet military as well as commercial needs, is named after Lieut. Col. Harold E. Hartney, president of General Airways. It has shown a speed of 140 miles an hour, with 1600 lb. pay load. The new Century engine also will be manufactured at Canestota.

Ford Seeks Large Engine for 100 Passenger Plane

DETROIT, Aug. 6—Newspaper reports to the effect that the Ford Motor Co. is contemplating the building of a 100 passenger Pullman airplane were confirmed by an official of the Ford company. About 6000 hp. will be required to drive this plane, it being desirable to use engines of 1000 hp. each, and preferably of the air-cooled radial type. A canvass of the aeronautical engine field is being made at present to determine whether such units may become available. If not the Ford company will go ahead with designs for such units themselves.

Ohio Licenses Car Assembled from Dump

COLUMBUS, Aug. 8—One of the most peculiar affidavits ever presented to Charles Sherman, bill of sale deputy in the office of the county clerk, appeared July 29 when H. S. Anderson made application with the sworn statement that the car "was assembled from parts found on the Fifth Ave. dump." A bill of sale was issued which permitted Anderson to secure number plates.

Bus-Rail Line Joins Detroit and Chicago

One Trip Each Way Daily Opens Service—One-Way Fare $7.50

DETROIT, Aug. 5—De luxe high-speed service between Detroit and Chicago, through the coordination of motor bus and electric railway facilities became a reality this month. The new line is operated by the Shore Line Motor Coach Co. in conjunction with the Chicago, South Shore & South Bend Railroad, both properties being under the management of Samuel Insull and associates.

Two White six-cylinder 100 hp. buses operate between Detroit and South Bend, where they connect with high-speed electric trains operated over a private right-of-way and entering downtown Chicago on the Illinois Central tracks.

Detroit bound passengers leave the Randolph street station in Chicago at 11 a. m. Central Time, traveling by electric train to South Bend, arriving at 1:33 p. m. They transfer to the buses, leaving South Bend at 1:35 and arrive in Detroit at 7:30 p. m. Chicago-bound buses leave Detroit at 11 a. m. Central Time, arriving at South Bend at 4:50 p. m. The electric train leaves South Bend at 5 p. m., arriving in Chicago at 7:30 p. m. The trains carry diners.

The buses seat 25 passengers and save considerable time on the non-stop run from Detroit to South Bend by avoiding large towns. Each bus is equipped with toilet and washroom facilities, over-stuffed air cushioned, seats, observation compartment and inside baggage compartment.

The total distance is 284 miles, the buses covering 194 miles and the electric train the remaining 90 miles. Fares are $7.50 one way; $14 round trip and $5 for the bus run between South Bend and Detroit.

Uppercu Breaks Ground

NEW YORK, Aug. 6—Ground has been broken for the new Uppercu Building which next year will house the activities of the Uppercu-Cadillac Corp., Cadillac distributor in New York, which now is operating in five different locations. The building will occupy the entire block-frontage on Columbus Avenue, from Sixty-second to Sixty-third St., with a depth of 125 ft. It will be 13 stories and basement —over 350,000 sq. ft.

P. O. Closes Air Routes

WASHINGTON, Aug. 10—All but one of the air mail routes, operated by the Post Office Department, have been disposed of and that will be discontinued on Sept. 1, the department announces.

Steel Market Seeks Larger Commitments

Fear Short Order Period in View of Higher Price Scale on Sheets

NEW YORK, Aug. 11—While automotive consumers in the last few days have placed what, in the aggregate, may be called a fair volume of orders, the steel market expects much more of them over the ensuing week or two. These expectations are accompanied by an undercurrent of uneasiness lest some of the larger automotive consumers are not yet reconciled to the new sheet prices. Many of them have so far managed to get along on what material was due them on old price contracts. Now that they must come back into the market it is feared that instead of making two bites of a cherry they may make four or more of it.

Sellers insist that they will not deviate from the sheet prices now quoted. Buyers do not say they will not pay these prices but the tonnages for which they commit themselves show that they are taking only what steel they absolutely need for immediate operating schedules. It has come down to an endurance test as to whether present sheet quotations will eventually be ratified by representative transactions once consumers are convinced that the market can not be budged or whether, tired of waiting in vain for a reassuring backlog of orders, some of the smaller independents will offer slight concessions to attract worth-while tonnage.

In this connection it is interesting to note that even those who are usually on the "inside" of all that transpires in the steel market are in the dark as to whether the sheet tonnage recently contracted by the Ford Motor Co. for the initial production of its new model carried a price showing present sheet quotations to be actually in force or what, if any, concessions were made.

Strip-steel demand has turned rather slow, most consumers being fairly well covered. Stripsheet capacity will be further increased by the impending going into operation of a new continuous mill in the Ohio Valley. Competition in the cold-finished steel bar market continues keen but finishers draw the line at going below 2.30 cents, Pittsburgh, on small lots.

Pig Iron—Following a very fair volume of buying by Michigan and Ohio automotive foundries, the pig iron market has turned more quiet. The Michigan price for foundry is $18.50, furnace, with the market decidedly weak.

Aluminum—Slightly better interest on the part of automotive consumers is reported by importers. With stocks in bond reduced approximately by 40 per cent from the January holdings of close to 7,500,000 lb., the market can endure somewhat more extensive imports from now on. No resale metal is being offered. The sole domestic producer has announced slight price revisions on sheets, circles, etc.

Copper—The market is now resting following recent activity during which prices were lifted to well above 13 cents. The advance was principally due to export demand. Home consumers have not yet covered very impressively. Copper, brass and nickel-silver products have been advanced another ¼ cent per lb.

Tin—The market's statistical position is strong. Prompt Straits tin opened the week at 65½ cents.

Lead—The market is somewhat more quiet, but producers are booked to the full extent of their capacity for the immediate future and, therefore, are rather pleased by the slowing down of the recent swift pace of demand.

Zinc—This market has also turned more quiet.

Hardwood Market Better as Prices Show Decline

ATLANTA, Aug. 9—Though most of the hardwood orders being received by lumber manufacturers and wholesalers in this district from the automotive field are still comparatively small and ask prompt shipment, inquiries have continued to show a steady improvement the last two weeks. There is every promise that sales will pick up considerably before the end of August.

Present inquiries are for the advance needs of the industry during the last quarter of the year and are principally for items in the white ash list, best grades, with an improving inquiry also reported for the second best grade of ash and for the best grades of maple and elm.

Prices are beginning to show a downward tendency as mills in the lower Mississippi Valley resume production on a more active scale. This is expected to further swell the volume of new business. Quotations the early part of August were considerably lower than in mid-July, and it is believed prices will continue to decline until they have approximately recovered the basis prevailing before the Mississippi flood cut down the output.

Hug Builds New Truck

HIGHLAND, ILL., Aug. 8—The Hug Co., manufacturer of Hug roadbuilder trucks, has started production on a new roadbuilder model known as Model 88, which is equipped with a 3½ yd. hydraulic power hoist body with a maximum load capacity of 8500 lb. The truck is equipped with a Brown-Lipe seven-speed transmission, a Buda 4 x 5¼ engine, heavy duty pneumatic cord tires and a full-floating type double reduction rear axle.

G.M.A.C. Nets $3,197,711

NEW YORK, Aug. 7—General Motors Acceptance Corp. reports net income of $3,197,711 after charges, for the six months ended June 30. This compares with $2,613,823 in the same period of 1926. Six months net profits are equal to $9.14 on 350,000 shares of capital stock outstanding, as against $13.76 a share on 100,000 capital shares in the first half of 1926.

Earnings Comparison Shows GM Stock Low

Common Stock Nets More Than Three Times Balance for U. S. Common

NEW YORK, Aug. 8—General Motors Corp., although earning in the first half of 1927 almost twice as much as United States Steel Corp., is much more conservatively appraised in the stock market, it is shown by comparison of the latest financial statements.

Net profits for all securities of General Motors in the first six months of 1927 were $129,250,207, whereas U. S. Steel of the same period reported total earnings of $65,647,045. For the common stock General Motors earned $124,841,987, which was more than three times the balance available for U. S. Steel common, amounting to $39,855,360.

At the closing price on July 28, Dow, Jones & Co. points out, General Motors total market value was $2,128,821,000, while the valuation of Steel was $1,928,118,488. These figures include the market value of the stocks and the par value of the bonds outstanding. The market value of General Motors securities was 16.471 times the six months' net income, whereas Steel's market value was 29.366 times the first half year's income.

If, therefore, General Motors was selling on the same basis as U. S. Steel its market appraisal would be $3,795,561,579. Subtracting $165,926,892, the market value of General Motors preferred, the appraisal of the common stock would total $3,629,634,684, or $417.20 a share.

The present invested capital of U. S. Steel is estimated at $2,184,775,000, while General Motors investment is $684,308,000. Steel's net earnings during the first six months were, therefore, equivalent to return on investment of 6.01 per cent, against 37.78 per cent in the case of General Motors.

Midland Painting Unit to Enamel Car Frames

CLEVELAND, Aug. 9 — Midland Steel Products Co. has started construction at its Cleveland plant of a new automatic painting unit at a cost of $100,000. The new equipment will enable the company to meet the growing demand in the automobile trade for a better quality product, according to E. J. Kulas, president. Upon completion of the unit, in 90 days, Midland manufactured frames will have a completed enamel finish before shipment.

The company's prospects for business during the closing months of the year are excellent. With the indicated stepping up of motor car output, orders and production on passenger car and light truck frames are increasing, said Mr. Kulas. The company is getting into production on its new Steeldraulic four-wheel brake at the Detroit plant.

Two British Makers to Maintain Prices

Wolseley and Talbot Guarantee Prices for 15 Months to Stabilize Sales

LONDON, July 28 (*by mail*)—With a view to encouraging confidence on the part of the buying public and so eliminating the dead season in car-buying, the Wolseley Motor Co., now controlled by W. R. Morris, and the Clement Talbot Co., makers of Talbot cars, have announced that no variation in prices will take place in their six-cylinder models during the remainder of this year or next year prior to the show period.

The prices in both cases are the same now and will remain the same as when the models affected in both cases were introduced prior to the show last year; they are the 16-45 hp. overhead camshaft Wolseley and the 14-45 hp. Talbot. The latter has proved remarkably popular since its introduction and the production program originally planned has been increased by 50 per cent, while the Wolseley six, at first under a cloud because of the financial troubles of its sponsors, has experienced an increasing demand since the old company and plant were bought outright and reorganized by Morris early this year.

General Action Unlikely

The policy of these two concerns in stabilizing their prices for 15 months ahead is a new departure for this country, but, although the object is one worthy of commendation, it is unlikely that British car manufacturers in general will follow the lead thus given. Questioned on the subject, several of them state that they fear to commit themselves so early and for so lengthy a period, considering that they would be placed at a grave disadvantage if any of their direct competitors, having made no promise to the same effect, lowered their prices at some later period.

It is worthy of note, too, that although Morris has adopted this policy in respect of the Wolseley six, he has not made any announcement concerning the Wolseley four, nor as to the prices of the Morris cars. Other makers have published their prices for 1928 models, but they have not given any undertaking as to variations.

British Production Lower

WASHINGTON, Aug. 10—A seasonal decline in production during July is reported in the automotive industry in Great Britain, according to cable to the U. S. Department of Commerce. The estimated output for the first six months is 95,000 passenger cars and 18,000 trucks. The cable says:

"Sales of cars have maintained a steady increase and imports have risen. Some makes of American cars have broken previous high sales records. To stimulate confidence, a number of firms are advertising no price changes during the present or the coming season. Increasing attention is given to time payment schemes and the used car situation. A healthy tone seems to exist throughout the industry and future prospects are reported as good."

Citroen to Build Cars in Yokohama

WASHINGTON, Aug. 10—The Department of Commerce is advised of plans of the Citroen company of France, to establish an assembly plant at Yokohama, Japan, according to cable from Trade Commissioner P. P. Steintorf of Tokyo. This will be the first French manufacturer to invade that country with an assembly plant. The French concern expects to erect a plant to produce 6000 cars annually and will expend 5,000,000 yen (about $2,500,000) in its construction.

Two American companies have assembly plants in Japan, having a present productive capacity of 28,000 cars.

Motor Fatalities Gain, N.A.C.C. Report Indicates

NEW YORK, Aug. 8—There were 590 motor fatalities in cities of more than 100,000 population in June as against 525 in June, 1926, and 542 in May, 1927, according to the National Automobile Chamber of Commerce. During the first half of the year deaths from motor accidents in these cities were 3001 against 2650 for the corresponding period of 1926.

In a statement accompanying the report, Edward S. Jordan, representing the street traffic committee of the Chamber, declares that signal lights cannot move traffic at its peak in the larger cities satisfactorily, and makes a plea for more general adoption of grade separation, whereby traffic is carried over or under an important intersecting highway.

Wright Gets French Order

WASHINGTON, Aug. 10—The successes of Lindbergh, Byrd and Chamberlin, with the Wright Whirlwind air-cooled engines, in their ocean flights has resulted in an order for 25 of these engines being placed with the American manufacturer by the French government, the American consul at Paris has advised the U. S. Department of Commerce. Two of the engines have also been purchased by the German government.

Fafnir Stock in Demand

HARTFORD, CONN., Aug. 9—Stock of the Fafnir Ball Bearing Co. has become a desirable acquisition since announcement this week of the perfection of ball bearing spring shackles after four years of experimentation.

A separate division of the company will handle the sales and service on the shackles.

Financial Notes

Spicer Mfg. Co. for the six months ended June 30, 1927, reports profit of $713,631 after depreciation, etc., but before Federal taxes, compared with $1,041,550 before Federal taxes in the first half of 1926. Company has outstanding 28,000 shares of 8 per cent preferred stock and 313,750 no par shares of common stock. Profit for the quarter ended June 30, 1927, was $372,324 before Federal taxes, comparing with $341,307 in preceding quarter and $520,971 in second quarter of previous year.

Marlin-Rockwell Corp. and subsidiaries report net profit for the first half of 1927 as $625,049, which compares with $692,479 in the first half of 1926. Earnings in the June quarter were $252,797 and $372,252 in the first quarter.

Servel to Increase Capital $3,000,000

EVANSVILLE, IND., Aug. 8—At the hearing of a receivership suit against the Servel Mfg. Co., builders of commercial car bodies, electrical refrigerators and gas engines, company officials not only claimed the enterprise to be solvent but announced a program of proposed manufacturing facilities that will imply an outlay of several million dollars.

The proposed expansion features are investment of $3,000,000 in additional capital stock; transfer of the Newburg, N. Y., plant to Evansville, and the location of all official departments here.

At the suggestion of H. H. Hornbrook, Indianapolis attorney, who claimed to represent owners of $2,800,000 worth of preferred stock, Judge Durre consented to the appointment of a "friendly receivership" comprising Frank R. Wilson, local banker, to represent Evansville banking interests; Col. Frank E. Smith, New York, chairman of the Servel board, to represent outside banking interests, and Fred P. Nehrbas, Servel vice-president and general manager, to represent the company.

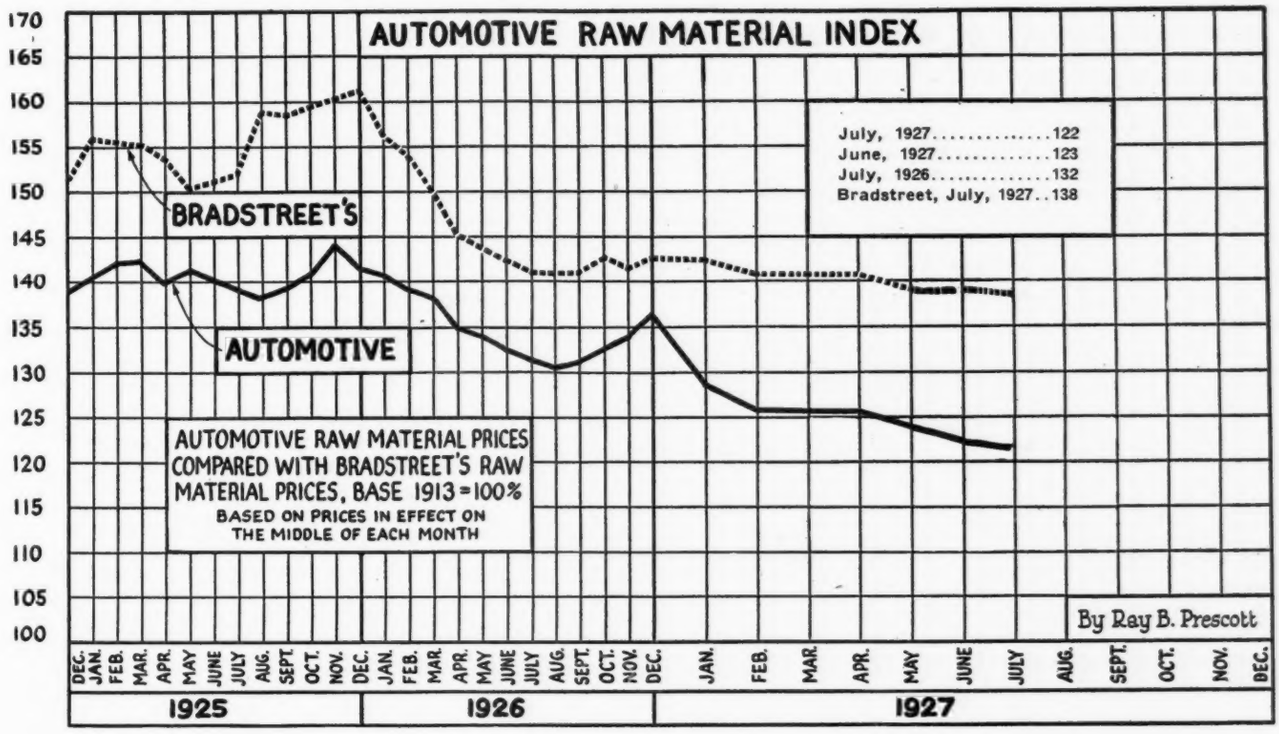
Reorganization Arranged

NEW YORK, Aug. 10—A plan for reorganization of the Servel Corp. and subsidiaries has been arranged and a syndicate formed to underwrite it. The reorganization committee is made up of leading New York bankers and financial men.

Hardware Convention Oct. 17

PHILADELPHIA, Aug. 10—The thirty-third annual convention of the National Hardware Association of the United States will be held at Atlantic City, Oct. 17 to 20, with headquarters at the Marlborough-Blenheim. Sessions of the accessories branch of the association will be held on the 18th.

Raw Material Index Falls One Point



Tire Companies Expect Large Last-Half Sales

AKRON, Aug. 5—There is a more optimistic feeling in tire manufacturing circles as a result of satisfactory earnings by most of the major companies in the first half year and the continued stability of retail tire prices. Prospects for the last six months of the year are regarded as bright. The current quarter is the big tire selling period of the year, and it is likely that the industry will establish a new high record for turnover in this period.

Sales and production of tires during July were heavy, being considerably above the same month last year. Plants in the Akron district are turning out more than 140,000 tires a day, with indications that high schedules will be continued during August.

Prices of small size tires sold to automobile manufacturers for original equipment reduced 7½ per cent, will in no way affect the retail market.

Exports Reach New Record

WASHINGTON, Aug. 5—Exports of tires and tubes from the United States in June broke all previous existing records, according to the rubber division of the U. S. Department of Commerce. Casing exports totaled 294,671, valued at $3,657,756. Inner tube exports totaled 169,560, valued at $339,080, the average unit value being approximately $2 per tube.

Solid tire shipments totaled 6075, valued at $197,022. Tire repair material shipments totaled $184,374. The unit value of casings declined from the May peak of $13.17 to $12.43 in June. The June value was $5.40 less than the unit value for the average of 1926.

Used Car Sales Increase in Chicago Reserve Zone

CHICAGO, Aug. 5—June sales of new cars, both wholesale and retail by 71 retail automobile concerns in this reserve district, were below the levels of the corresponding month a year ago, and were also lower than in May, 1927. On the other hand, the number of used cars sold were greater and there was a decline in used car stocks. New car stocks were slightly greater than a year ago. Comparisons follow:

	P. C. Decline from May, 1927	June, 1926
Number new cars sold wholesale	39.1	21.1
Value new cars sold wholesale	33.3	25.8
Number new cars sold retail	16.8	27.7
Value new cars sold retail	11.2	14.8
Number new cars on hand June 30	7.4	*1.2
Value new cars on hand June 30	9.2	*3.5
Number used cars sold	*2.5	*8.0
Number salable used cars on hand	11.3	16.3
Value salable used cars on hand	0.7	16.2

* Increase

Rubber Imports Lower

WASHINGTON, Aug. 10—Imports of crude rubber into the United States during the week ending July 30 totaled 6529 tons and represents a large decline in shipments through London and Liverpool during the week.

South America Increases Car Imports to $46,000,000

WASHINGTON, Aug. 10—United States exports of passenger cars and trucks to South America during 1926 totaled $46,000,000—an increase of $26,512 over the 1925 exports to that country, H. H. Tewksbury, automotive trade commissioner to South America, reports to the Department of Commerce. In round numbers, he reports, South America took one out of every five cars exported from this country. Accessories, motorcycles and aircrafts increased the total automotive imports last year to $61,787,693.

The report points out that the six leading markets of South America, in order of their importance, were Argentina, Brazil, Uruguay, Venezuela, Colombia and Chile. These received 65,769 of the 68,394 United States cars and trucks shipped to South America, and out of this total Argentina and Brazil took 49,626, or 73 per cent.

Canada Tire Exports Gain

WASHINGTON, Aug. 9—Canadian tire manufacturers exported a total of 174,164 tires in June, compared with 132,710 in May, and obtained a price of $10.12 per casing in June compared with $9.97 in May, according to figures furnished the rubber division of the U. S. Department of Commerce. The leading markets for Canadian casings in June was the United Kingdom, British South Africa, New Zealand, Irish Free State, Argentina and Dutch East Indies.

Automotive Exports 8.5% of June Total

WASHINGTON, Aug. 10—Automotive exports in June of this year constituted 8.5 per cent of the total of all exports combined shipped from the United States to foreign countries, according to an analysis of foreign trade for the month made by the Department of Commerce. The total exports were $356,947,000 for the month and of this sum $30,649,000 or approximately 8.5 per cent were accounted for by automobiles, trucks, etc.

Comparing June, 1927, with June of last year the figures show that the total exports of all commodities increased but 6 per cent, whereas the automotive exports in June, compared with June of last year, showed an increase of 28.5 per cent, or more than four times the amount of increase when compared with all other commodities.

Spain to Change Tax Base

WASHINGTON, Aug. 5—A change in the method of automotive taxation in Spain has just been announced to the U. S. Department of Commerce. The old system was on a basis of 35 pesetas per year per horsepower. Under the new system the first 10 hp. will be 20 pesetas each; from 10 to 15 hp., 20 to 30 pesetas; from 15 to 20 hp., 30 to 40 pesetas. Motor buses henceforth will be on a basis of horsepower.

Aeronautic Section to Meet

SPOKANE, Aug. 9—The aeronautic section of the Society of Automotive Engineers will meet in Spokane during the week of the National Air Derby, Sept. 19-24. Mr. Heywood estimated there would be between 50 and 100 engineers attending the Spokane meeting. Definite details as to the program and date have not been decided upon.

Maryland Erecting Standard Road Signs

BALTIMORE, Aug. 8—The Maryland State Roads Commission has announced that 4000 road signs of the type designated by the Department of Agriculture and the American Association of State Highways officials are to be erected on all the highways running through Maryland and all the important state highways. Five hundred of the signs, which will be erected at important crossings, will be of the illuminated type, on which the highway number will show out. Of the total 2500 will guide motorists on the six Federal roads.

German Air Lines Near Independence of Subsidy

WASHINGTON, Aug. 5—Commercial aviation in Germany is proving profitable to the extent that within a year commercial lines will be able to operate without a state subsidy, according to figures just forwarded to the Department of Commerce by the American consul at Berlin.

The report covers the Lufthansa Co., Germany's subsidized air transportation company. During 1926 it carried 93,000 passengers, a total of 3,822,250 miles, with but one fatality. A fleet of 200 planes is operated and a distance of 46,000 miles is covered every day, flying over 18 European countries, with 70 airports. An average speed of 100 miles an hour is maintained.

Industry Topics on Steel Program

CLEVELAND, Aug. 5—At the fifth annual convention of the American Society for Steel Treating to be held in Cleveland, Sept. 19 to 23, a number of papers will be read which are of immediate interest to the members of the automotive industry. Among those which appear to have the most direct interest are the following:

Metallurgy and Aircraft, Testing Automobile Body Sheet Steel, Evaluating Quality of High Speed Steel Tools, Wear of Plug Gages, Ball Bearing Steels, Comparison of Brinnel, Rockwell and Scleroscope Tests.

These are only a few of the many papers to be presented and many others will undoubtedly be of automotive interest.

Postal Receipts Decline

WASHINGTON, Aug. 10—Postal receipts from the 50 largest cities in the United States decreased 1.81 per cent in July compared with July of last year, the Post Office Department announces. The total receipts of the 50 cities amounted to $26,299,872 last July. Five Sundays in the month accounts in part for the decrease, the department advised, but the figures in the main are accepted by the department as indicative of the business trend at present.

New Parking Garage Opened

BALTIMORE, Aug. 8—The Downtown Garage, with a capacity of more than 400 cars, has been opened in the heart of the congested section by the Motoramp Garages of America, Inc., which operates garages in several other cities. This is the first garage of its type in the state. D. E. Irwin is manager.

Calendar of Coming Events

SHOWS

American Electric Railway Association, Public Auditorium, Cleveland..Oct. 3-7
American Road Builders Association, Public Auditorium, Cleveland..Jan. 9-13
Automotive Equipment Association, Coliseum, Chicago .....Nov. 7-12
*Chicago, National Automobile Chamber of Commerce, Coliseum Jan. 28-Feb. 4
International Aircraft Show, Berlin March 23-April 11
International Aviation Exhibition, Copenhagen .....Aug. 20-Sept. 2
Lille, France, Exposition....Nov. 20-Dec. 4
London Passenger Car Show....Oct. 14-22
London Truck Show .....Nov. 17-26
Machine Tool Exhibition, New Haven, Conn. .....Sept. 6-9
Machine Tool Exposition, National Machine Tool Builders' Association, Public Auditorium, Cleveland Sept. 19-23
National Air Races, Spokane, Wash..... Sept. 23-24
National Standard Parts Association, Convention Hall, Cleveland..Nov. 14-19
National Steel and Machine Tool Exposition, American Society for Steel Treating, Convention Hall, Detroit, Sept. 19-23
*New York, National Automobile Chamber of Commerce, Grand Central Palace .....Jan. 7-14
Paris, Grand Palais .....Oct. 6-16
Salon, Automobile Salon, Inc., Hotel Drake, Chicago .....Jan. 28-Feb. 4
Salon, Automobile Salon, Inc., Hotel Biltmore, Los Angeles.....Feb. 11-18
Salon, Automobile Salon, Inc., Hotel Commodore, New York..Nov. 27-Dec. 3
Salon, Automobile Salon, Inc., Hotel St. Francis, San Francisco Feb. 25-March 3

*Will have special shop equipment exhibit.

CONVENTIONS

American Chemical Society, Detroit, Sept. 6-8
American Electric Railway Association, Public Auditorium, Cleveland..Oct. 3-7
American Institute of Mining & Metallurgical Engineering, Metals Division, Book-Cadillac Hotel, Detroit .....Sept. 19-23
American Road Builders' Assn., Hotel Hollenden, Cleveland .....Jan. 9-13
American Society of Mechanical Engineers, Machine Shop Practice, New Haven, Conn. .....Sept. 7-9
American Society of Mechanical Engineers, First National Fuels Meeting, St. Louis .....Oct. 10-13
American Society for Steel Treating, Convention Hall, Detroit....Sept. 19-23
American Welding Society, Book-Cadillac Hotel, Detroit.....Sept. 19-23
Automotive Equipment Association, Coliseum, Chicago .....Nov. 7-12
International Congress for Testing Materials, Amsterdam .....Sept. 12-17
Motor and Accessory Manufacturers Association, Credit, Detroit..Sept. 14-16
National Safety Council, Stevens Hotel, Chicago .....Sept. 26-30
National Standard Parts Association, Hotel Hollenden, Cleveland..Nov. 14-19
National Tire Dealers' Association, Louisville, Ky. .....Nov. 15-17
World Motor Transport Congress, London .....Nov. 14-17

S. A. E. National

Aberdeen Proving Ground, Oct. 6—Joint meeting with Army Ordnance Association.
Chicago, October—National Transportation and Service Meeting.
Chicago, Dec. 1—Tractor Meeting.
Cleveland and Detroit, Sept. 19-22—Production Meeting.
Detroit, Jan. 24-27—Annual Meeting.
New York, Jan. 12—Annual Dinner.
Spokane and Chicago, week of Sept 12—Aeronautic meeting.

RACES

Altoona, Pa. .....Sept. 5
Atlantic City .....Sept. 5
British Grand Prix, Brooklands....Oct. 1
Charlotte, N. C. .....Sept. 19
Detroit .....Sept. 10
Los Angeles .....Nov. 24
Salem, N. H. .....Oct. 12
Syracuse, N. Y. .....Sept. 3